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ABSTRACT

In an effort to analyze what management policies and technologies from other disciplines can be applied to the field of education, this report describes the development of an analytical framework and its use to explore implications for policy development. The present work seeks to synthesize the available literature on management policies and to apply the authors' understanding of research, development, and innovation (R/D&I) systems in general to the identification of policy issues and options for strengthening educational research and development. The volume comprises 19 chapters discussing the key generic features of an R/D&I system. Part 1 treats general features of the system, part 2 focuses on an historic overview of R/D&I development and functions, part 3 discusses R/D&I in education and identifies three aspects of educational R/D&I that have been largely neglected, and part 4 considers the state of development of R/D&I system studies as well as future goals, funding, and capacity. (Author/WD)

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PREFACE

Although R&D management is a well-developed specialty in several other fields, it has been virtually non-existent in education and badly needed. It has been our continuing belief that there is much that could potentially be applied from these other fields. This would require a comparative management knowledge base about research, development and innovation (R/D&I) formulated in a manner that made it useful for application. An understanding would also be required of those aspects of system functioning which should be viewed as generic across all R/D&I* systems and those attributes which are derived from the particular contextual conditions characterizing R/D&I in specific sectors -- such as education. With this kind of understanding, we could then determine which management policies and technologies could be transferred "as is" from other sectors, which others needed modification, and what sorts of modifications were required. Consequently, we developed an analytical framework that might permit us to apply understandings and management technologies from R/D&I systems in other sectors, examine R/D&I system features across sectors to determine what aspects of system functioning were generic across R/D&I systems and which others were contextual, and what the implications of this might be for policy development.*

In the last few years, we have carried out many analyses and produced several volumes describing our analytical framework and applying it to specific policy issues in education and other fields as well.[2] During this time, we have been developing this descriptive volume on the R/D&I system in education, attempting both to synthesize the available literature and to apply our understanding of R/D&I systems in general towards identifying policy issues and options for strengthening educational R/D&I.

This volume is comprised of nineteen chapters, which discuss the key generic features of an R/D&I system as identified in our analytical frame-

*We use the term Research, Development and Innovation (R/D&I) to connote a total process of innovation which includes various knowledge production functions (research, development, production), various knowledge utilization functions (acquisition, implementation/utilization, support services), and various functions which serve to link knowledge users (need identification, dissemination, evaluation research). This emphasis on a total process of innovation has been a growing emphasis in recent years, and often is referred to by the term KP/KU or KPU (knowledge production/utilization).

work. Part I covers eight overview features that pertain to the system as a whole: its historical development (Chapter 1); its environment (Chapter 2); system goals as they have evolved and shifted over the years (Chapter 3); the system's institutional base (Chapter 4); its personnel base (Chapter 5); funding patterns and policies (Chapter 6); information flows (Chapter 7); and research and R&D outputs the system has produced (Chapter 8).

In Part II, we focus on eight R/D&I functions: need identification (Chapter 9); research (Chapter 10); development (Chapter 11); dissemination (Chapter 12); acquisition (Chapter 13); implementation and utilization, which we treat together in a single chapter (Chapter 14); and evaluation (Chapter 15).

In Part III, we note three aspects of educational R/D&I that have received little if any treatment in the educational literature: administration and management (Chapter 16); production (Chapter 17); and support services (Chapter 18).

Finally, in Part IV, we consider a final R/D&I feature of particularly keen interest to us, the state of development of R/D&I system studies -- the analysis of the various components of the R/D&I system and the processes through which it functions, so as to understand the underlying dynamics of what is occurring and provide a sound empirical and analytical basis for policy development to strengthen system functioning.

We have used the terms "system", "system management," "R/D&I", and R/D&I "community" repeatedly in our discussions, and this usage clearly requires some elaboration since we are well aware of the substantial potential for misunderstanding which surrounds these terms.

<u>System</u>: Our analyses have all been premised on the assumption that the configuration of institutions, personnel, linkages, information flows, etc. that comprise the educational R/D&I enterprise can best be understood as a "system" (albeit a weak, diffuse, immature, loosely linked, highly decentralized system) made up largely of autonomous elements with relatively

little control or direction from any central authority in a position to "manage" the system. We are also well aware that because of this diffuseness, pluralism, autonomy of elements, etc., the characterization of this enterprise as a "configuration" rather than a system has gained some prominance. However, we have argued in several of our analyses that the system notion has many advantages if it is viewed as a helpful construct rather than as a description of empirical reality.

For one thing, the system perspective orients one toward the dynamic manner in which different elements of the system interact, such that policies designed to affect one system component have inevitable side-effects on other components. Thus, the system perspective orients the policy maker toward potential interactions, and focuses policy thinking on likely impacts of a given policy option throughout the R/D&I system. Our analytical framework was designed to help the policy maker think through the potential interactions, almost in checklist fashion among and across the system features that might be affected by any given policy option. Thus, the policy maker is led to ask: which features are affected by the option under consideration, and what insight on the wisdom of this particular option is provided by what we know about the interactions among these system features in other R/D&I systems?

A second advantage of the system perspective (especially when one has some comparative understanding of R/D&I systems in a range of sectors) is the manner in which it directs attention to maturational issues. Analysis of R/D&I systems has suggested that they evolve through various historical stages, from birth to a transitional phase, to increasing progress toward maturity -- while recognizing that fixation at a given stage and/or regression can also occur. Certain difficulties are characteristic of R/D&I systems at certain stages of their historical development, but become less serious or even disappear altogether as problems as the system matures. Other difficulties, however, are traceable to factors inherent in the nature of certain contexts, and therefore are not likely to be substantially affected by increasing system maturation over time. For instance, education by its very nature is built on a social science knowledge base rather than a physical science knowledge base, and this has enormous ramifications for the conduct and impact of R/D&I activity. Education is a conjunctive domain of knowledge, i.e., it brings together many different disciplines and applied fields in the solution of social problems, and this too has substantial ramifications which make educational inquiry, for instance, very different from inquiry within one of the disciplines. Further, its effects can also be seen in the field's personnel and institutional base, its information flows, and outputs, the degree of consensus achievable on system goals, the supportiveness of the system's environment, etc.

It becomes important to be able to distinguish between which problems of system functioning are traceable to maturational features and which are attributable to inherent attributes of a given context. Planning to overcome maturational difficulties must take time into account, i.e., it must take cognizance of the fact that the configuration of circumstances is likely to change with time and maturation. Policies appropriate for strengthening an area of system functioning at one point in its development are not likely to be equally appropriate at a later point in the maturation process. Initiatives that might not be effective at one time may be highly effective at another time. Therefore, the policy maker who thinks in system maturation terms and has developed some understanding of the accumulating body of knowledge on comparative R/D&I systems will focus attention on the current state of development of the system or system component of concern. A given policy problem will be viewed with a broader understanding of the configuration of conditions that are most effective for overcoming those difficulties, at the particular stage of development that has been reached.

It is for these particular reasons that we see the system-oriented perspective as being highly useful for policy development. This brings us to another term likely to raise some eyebrows. We frequently use the phrase "system management" to describe the activities of NIE* and other educational R/D&I sponsors to orient the system in certain functional areas, supporting

*At the time of this writing, the new Department of Education was just coming into being and of course this will lead to important changes with respect to some issues we discussed. However, the fundamental issues remain the same.

the development of certain new capabilities in the institutional and personnel bases, etc. We do not mean by our usage of the term "system management" that it is possible to manage this amorphous system in the same way as it is possible to manage a single organization or organizational unit. Clearly, the description of the loose body of autonomous institutions described in the configurational perspective is a reasonably valid characterization of certain aspects of the empirical reality of educational R/D&I today, and possibly for all time. Still, we believe strongly in the lead agencies in concert with other R/D&I sponsors and the field can in very real ways orient the system. This understanding of what we have in mind when we use the term "system management" is vital.

Similarly, when we use the term "community" (e.g.: the "research community", the R/D&I community", the "practice community"), we are using the term loosely to describe a body of institutions and personnel who share common interests and may one day be linked more effectively through better developed information flows, communication mechanisms, social structures, etc. We are not suggesting that either a sense of community within any of these groupings, or the needed linkages and information flows, etc. actually exist today.

Finally, we turn to our use of the term "R/D&I". We have consistently used the term "Research, Development and Innovation" (R/D&I) to describe what is increasingly being referred to by others as KPU. The Research, Development and Innovation usage was meant to make clear that we had more than simply "R&D" in mind, and that KU activities within the operating system and linkages between the KP and KU ends of the spectrum were very much a part of our conception of the innovation process. Our R/D&I usage has not been adopted by others in the field of Education where the KPU usage is becoming increasingly popular. It is however (with minor variations such as R/D&I) very popular outside of Education - and in these contexts KPU has not gained much currency. It is difficult to predict which will survive, in general, or in specific fields. Since consensus on terminology is often a necessary first step in the development of a new field of knowledge, we would be willing to adopt either the "R/D&I: or the KPU label in subsequent drafts of our material. Regardless, "R/D&I" throughout this volume should clearly be understood to be analogous to "KPU" and not be assumed to focus on "R&D" in the narrow sense. Our interest throughout has been on the total innovation process, and this point should not be misunderstood.

The analyses presented in this volume are part of an ongoing effort. Our long run expectations for this project are ambitious, perhaps overly so. In addition to the analytical framework developed and the policy studies we conducted applying this framework, we have broad expectations about what this education-specific component of the research program would produce. In addition to producing this comprehensive synthesis of the available literature on (or relevant to) educational R/D&I, we would hope at some future date to develop: an annotated bibliography of the voluminous literature; a discussion of how education compares to other sectors on key dimensions; a set of policy and research agendas for strengthening educational R/D&I; and conceptual work on needed indicators for assessment in a monitoring system on educational R/D&I functioning. However, within the resources available to us, it has only been possible to complete the simple research and synthesis of the available literature in the comprehensive fashion we desired. Even so (as can be readily observed) this has been an enormous undertaking; and even in this volume there are chapters that merit further elaboration and development. In addition, we anticipate producing over time all of the elements of our overly ambitious research program.

At least three things need to be said about the lengthy time period over which this work has been carried out. One is that the nineteen chapters that make up this volume have been written at different times over a four year period. As a consequence, there is some overlap and repetition of material that we would expect to be eliminated after editing for a final version of this material.

Second, our understanding of educational R/D&I has evolved over this period, particularly in certain respects. Like the rest of the field, we too have come to a greater appreciation of the operating system's role in educational R/D&I as involving a considerably more active posture than simply that of "user". We have tried to take cognizance of this, for instance, by talking about practice-based development work in addition to the systematic R&D carried out by specialized development organization, and about information flows within the operating system, and between the educational R/D&I and practice communities, as well as among research communities. We treat operation system roles and contexts in some detail in our chapter on the implementation and utilization functions, taking cognizance of both problem solution and KP activities that take place entirely or largely within the operating system as well as operating system adaptation, implementation, and use of outputs developed and/or packaged by specialized development organizations. And so on. What is significant to our discussion here is that this perspective on the operating system has evolved over the several years of this work and is reflected more effectively in chapters written recently than in chapters written earlier and only revised in minor ways recently. This should be borne clearly in mind by the reader. In the final version of our volume, the material will be redrafted in a manner that consistently reflects this greater prominance of the operating system in our conceptions of R/D&I system structure and functioning.

And finally, we owe an enormous debt of gratitude to Ward Mason, head of NIE's R&D System Support Division, who has patiently and helpfully supported our work throughout this long period. Ward Mason and his staff have seemed to us to be perhaps among the few lone voices in the current Washington wilderness calling for an R&D system studies capability and field of inquiry, to provide a sound conceptual and empirical data base for educational R/D&I policy development. His commitment to this area has given it birth and kept it alive (to whatever degree it still is alive) as a viable area of federal education funding, and we (as well as all of our colleagues in this emerging field) are heavily in his debt for this. We would hope to be able to provide him with some dividend on his considerable investment of time and energy in this effort, and hope this volume (in this and subsequent versions) can make some contribution to the development of the field of educational R&D system studies he has envisioned and supported, and to which in a very real sense he has given life.

FOOTNOTES

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2. Michael Radnor, Harriet Spivak, Earl C. Young, Durward Hofler, and Raymond J. Buckley, Comparative Research, Development and Innovation Systems: With Implications for Education. Abridged Report to the National Institute of Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977); Michael Radnor, Harriet Spivak, Durward Hler, and Earl C. Young, Agency-Field Relationships in the Educational R/D&I System: A Policy Analysis for the National Institute of Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1976); Durward Hofler, Michael Radnor, and Harriet Spivak, Regionalism in Educational R/D&I: A Policy Analysis for the National Institute of Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977); Michael Radnor, Durward Hofler and Harriet Spivak, Strengthening Fundamental Research Relevant to Education: A Discussion of the Reports of the National Academy of Sciences and the NCER Program Committee (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977); Michael Radnor, Durward Hofler and Harriet Spivak, Assessment of Educational R/D&I (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1976); Michael Radnor and Durward Hofler, ed., Policy Studies in Research, Development and Innovation (Evanston, Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977); Michael Radnor, Harriet Spivak and Durward Hofler, Research, Development and Innovation: Contextual Analysis (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977); Michael Radnor, Durward Hofler and Robert Rich, eds., Information Dissemination and Exchange for Educational Innovations: Conceptual and Implementation Issues of a Regionally-Based Nationwide System (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

CHAPTER ONE

HISTORICAL DEVELOPMENT OF EDUCATIONAL R/D&I.

HISTORICAL DEVELOPMENT

Page

Page

Page

An understanding of the historical development of any R/D&I system is essential to the design of effective policy options and management strategies. The history of a system is likely to be one of the most significant constraints that needs to be taken into account -- as powerful in impact on attitudes, expectations, institutional configurations, and operational patterns as any constraints in the environment of the system. Critical events in that history must be understood in terms of the ways in which they affected the definitions of problems, strategies, and solutions, and the ways in which they created, or closed off, potential options for improving KPU functioning.

We have, in our work, used a conception of R/D&I systems going through various stages of growth and development -- from the uncertainties and insecurities of birth and early years, to a transitional period of striving and establishing themselves and their legitimacy, to a more mature period in which their functions, institutions, and linkages are well established. We frequently discuss policy options in terms of what we see as needed to make possible "further maturation" of the system. We have no precise universal model of what a "mature" R/D&I system looks like. However, our familiarity with R/D&I systems in different sectors gives us some sense of which attributes systems demonstrate (in different degrees) that suggest to us they are more or less mature. What this means concretely in different R/D&I systems is likely to differ from sector to sector; but the maturation notion seems to us to be one that is highly useful to further understanding of R/D&I systems and development of feasible policy options and management strategies.

If one understands the history of the educational R/D&I system to date in terms of this maturation concept, and in relation to the experiences of other systems, then several benefits may be forthcoming.

First, viewing the system's past in these terms may help observers to be more charitable, and less likely to arrive at the apparently all-too-common conclusion that given what relatively little the system has accomplished to date there is little reason to expect better in the future. Our experience with young R/D&I systems in other sectors suggests that in the early years one generally finds unrealistically high expectations and over optimistic forecasts concerning high quality results -- to be delivered quickly and implemented on a widespread basis. Since in reality the development of an R/D&I system (and its outputs) takes much longer and requires much more investment than is usually recognized at the time, one soon also finds frustration and a tendency to "overreact" on the part of R/D&I system personnel, funders and sponsors. Thus, this maturation notion suggests the advisability of assessing the educational R/D&I system at the present time in terms of whether or not a strong basis for the future (and future returns) has been developed -- <u>not</u> in terms of sunk costs, disappointments, and unrealistic early expectations.

A second perspective gained from use of the maturation concept revolves around the idea that R/D&I systems evolve through three rough stages of development (introductory, transitional and mature) and that R/D&I functioning has distinctive attributes at each stage of development. If this is true, then it has several important implications:

1. If capacity-developing, system-building policies and programs are to be designed, able to increase the possibility of nudging a system along from one stage of development to the next, then it becomes essential to understand how the attributes of R/D&I functioning may differ from stage to stage and where the critical

points of leverage may be as the targets of policy intervention. Insights gained from other sectors, at various stages of their own historical development, may be useful here.

2. Consideration of policy and management options must take a system's stage of historical development into account. It would be clearly inappropriate, for instance, to transfer advanced and sophisticated management technologies from mature R/D&I systems to other systems that are in only the introductory stage of development. (As an example of this, the use of PERT for program planning was tried in regional laboratories early in their history, with rather unsatisfactory results in many of them.[1]) Equally true, though, policies or approaches tried early in a system's history with little success may still be appropriate and effective later in a system's history, when it may have developed needed capacities or acquired requisite resources or changed in any of a number of other ways making the earlier experience less relevant to judgments of likely future success. One cannot validly say, policy X has been tried and failed, if it was tried under the wrong conditions and without what was needed to make success possible.

Clearly then, understanding a system's history in relation to this conception of historical stages of system development can be of great value to assessing policy options.

Our discussion of the historical development of educational R/D&I begins with a consideration of the available literature and the sources from which a picture of the system's history can be constructed.

The remainder of the analysis is divided into three parts -- examination of the system's past, its present, and its future, using descriptive detail, the maturation concept, and related ideas drawn from our analytical framework.[2] What critical events, historical trends, and time-bound influences shaped the system and brought it to its present state of development? Which of these continue to be felt as major constraints on policy formulation and R/D&I functioning? We examine these questions in the course of an overview of the system's brief past. We then consider evidence on various indicators of the system's present maturation status. We attempt here not only to document what few would doubt, that educational R/D&I will require considerable nurturing and evolution before it can become (if indeed it ever can become) a mature system; but beyond that, we attempt to demonstrate some of the key problems in current functioning that seem to block system maturation into the next (the transitional) stage of development and ultimate maturity. Finally, we consider the system's future -- possible policy options that might overcome some of the key points of weakness identified earlier, especially those that seem to be of major importance in retarding system maturation. We also suggest a number of research questions that need to be considered using historical and comparative insights from other sectors, to inform judgments of the viability of some of the suggested interventions to overcome system weaknesses. In outlining these possible policy options and research initiatives, we foreshadow many of the conclusions we reach in subsequent chapters analyzing aspects of educational R/D&I.

I. THE AVAILABLE LITERATURE AND SOURCES

There is a vast literature of source documents relevant to constructing a history of the institutionalization of educational R/D&I over the last decade or two -- memos produced by or for government officials presenting their thinking; reports evaluating the institutions that were produced, almost from the outset of their creation; articles explaining to the research community and the public at large what was done and why; commentary in various kinds of publications about one or another aspect of the system; etc.[3] We have relied heavily on as much of this source material as we could obtain in constructing the history presented here.

In addition, there are a few chapter-length or article-length histories of educational research over the last century or since the '50s, most of which have appeared only within the last few years.[4] Those that cover the longer period are useful in giving a sense of educational research as a specialized field with a history that goes back at least into the 1890s, with some units such as the Office of Education going back to the 1860s. Read in relation to the recent period of 15-20 years, these histories of the longer period also give a sense of how much development the field has suddenly undergone in only the very recent past.

Clearly, the single most important piece of work on that recent period appeared only a year ago, after the first draft of this chapter was already completed. Richard Dershimer, formerly Executive Director of the American Educational Research Association, throughout the 1960s and early 1970s, has written an excellent, insightful, highly useful history of the period rich in detail, well documented, written from the perspective of someone well connected to what was happening in Washington, when it was happening, who knows who to talk to in order to find out what really happened with regard to this and that. He has taken pains to provide a scholarly treatment, to check his own recollections with sources, and to present his history in a way that can be used by others who wish to dig further into the history of the period. Dershimer's <u>The Federal Government and Educational R&D</u>[5] is <u>must</u> reading for anyone concerned with understanding the institutionalization of educational R/D&I, one of the relatively few volumes we would place in this category. We have taken note of information from the Dershimer volume at a number of points in this chapter. Subsequent drafts are likely to use the Dershimer material even more. Clearly, if there was one single volume to be recommended for understanding the OE years of leadership of educational R/D&I, this would be it. It suggests the kind of history needed of the NIE years as well as of other agencies and their roles in sponsoring educational R/D&I.

II. THE HISTORICAL PAST: CRITICAL EVENTS, LEGISLATION, SPONSORSHIP PATTERNS, DIRECTIONS, ASSUMPTIONS, AND STRATEGIES

A truly comprehensive history of the institutionalization of educational R/D&I would be a massive undertaking. Given the nature of KPU in education ~~and,~~ the key role played by the operating system -- in much of the KP and linkage as well as KU that impacts on educational practice -- such a comprehensive history should consider both specialized, institutionalized KPU and other less specialized, non-institutionalized, practice-based forms of educational KPU. At the very least, such a history would analyze the key ideas and critical events and developments that determined the character (or more correctly, the somewhat diverse character) of educational R/D&I today -- the character of the system (or "configuration") as a whole and its various parts (e.g., the academic sector, private sector, regional laboratories and other institutions in the quasi-public sector, the SEAs, ISAs, and LEAs) and each of the comparative features in our analytical framework (e.g., funding, personnel, institutions, research, development, dissemination, etc.). A truly comprehensive and useful history would probably give as much attention to the development of the field's knowledge and technology base as to all of its other systemic properties.

We have not attempted such an imposing task. Our approach was considerably more modest in scope. We have reviewed some of the history of the past two decades with a view toward discerning some of the underlying assumptions and R/D&I strategies that critically influenced system development. We have not attempted to analyze important theoretical or empirical contributions that shaped the knowledge and technology base of the field.

The focus of our attention on this analysis has been the federal role in institutionalized R/D&I, and specifically the involvement of the Office of Education (OE) and later the National Institute of Education (NIE) in the institutionalization and sponsorship of educational R/D&I. We do not discuss here other federal agencies who have been sponsoring educational R/D&I activities. (We consider these and other non-federal and private sector sponsors briefly in a subsequent chapter on funding.) Nor even do we discuss the large number of relevant units and programs within OE relevant to a comprehensive understanding of the institutionalization of educational R/D&I. For instance, we do not consider the substantial R&D resources managed by OE under legislative mandates on vocational education and special education (i.e., education for the handicapped). In discussing OE, our attention is limited to the Bureau of Research, called the National Center for Educational Research and Development (NCERD) beginning in 1969. It then shifts to NIE when the Institute was created to play a leadership role in educational R/D&I and absorbed much of the role of the NCERD. The picture that we present, therefore, suggests a much more orderly, "managed" picture of the institutionalization of educational R/D&I than was in fact the case: it deals with only that small part established and managed by one and then another federal agency. This limitation must be emphasized at the outset and borne in mind throughout. We are looking at a very small, albeit from our perspective important, part of the whole, which is a considerably larger, more decentralized, less orderly, less managed, population of discrete, autonomous institutions. Given that proviso, we think there is much that is essential for the field to understand ahout the segment of the system (or "configuration") we have selected to focus on in this chapter.

The recent history of educational R/D&I, since the establishment of NIE, seems to us to be so very different in important respects from the previous period that we have divided our analysis into two parts. We examine first the period from the emergence of the federal role in educational R/D&I in the mid '50s until NIE was created in 1972. We then turn to the last five years in which the Institute has been the primary sponsor of, and dominant influence on, system development.

1. OE Leadership: 1950s to 1972

A. The 1950s: Emergence of the Federal Role

The mid '50s set the stage on a small scale for two sets of developments that were to intensify in the '60s and have a major impact on educational R/D&I. The first of these could be characterized as the emergence of race (and then poverty) as social and political issues in this country, in combination with the assumption that the schools should serve as one of the major vehicles for social reform. The psychological arguments so fundamental to the Brown vs. Board of Education desegregation deoision of 1954 were carried further in the "cycle of poverty" arguments of the '60s. Each position assumed that active intervention in the education sector could produce major social reforms and enhance the opportunities and "life-chances" of students. Although the Brown decision itself had relatively little impact on educational R/D&I in the '50s, its legacy in the '60s was enormous. Federal legislation and court decisions premised in part on this pattern of thinking have had a tremendous impact on school system organization and functioning and have created major curriculum and program needs to be met by R/D&I activities. R/D&I products and programs targetted at racial, ethnic, and linguistic minorities, and at the economically disadvantaged, have received the lion's share of R/D&I resources in the education sector.[6]

The second development of the '50s that was to have a major impact on the system was the emergence of the federal government as the primary sponsor of educational R/D&I. Educational research received a major boost from the passage of the Cooperative Research Act in 1954, authorizing research funding which began to flow into the educational research community by 1957. Subsequent Cooperative Research Act amendments and authorizations in the '60s, along with the Elementary and Secondary Education Act, created major new funding programs and the network of federally-funded R&D centers and regional laboratories that were the focus of federal R/D&I strategies in the '60s.

While the early Cooperative Research Act funding of the '50s tended to be allocated to discrete, relatively small-scale educational research projects, other blocks of federal funding in the '50s came to be concentrated on larger scale curriculum improvement projects. The preponderance of federal influence can be seen in the history of these projects. The beginnings of substantial support for curriculum improvement must be traced back at least as far as the early '50s when the Carnegie Corporation sponsored curriculum design and teacher training program development by mathematicians and scientists. Within a few years, the National Science Foundation allocated such large sums to the work of scientists to completely overhaul the high school curriculum for physics, chemistry, and biology[7] that the earlier Carnegie projects were dwarfed in comparison. The excitement created by the science curricula, textbooks, and materials created so much support for this kind of development work that major curriculum improvement projects were developed in mathematics, English and language arts, social studies, and foreign languages.[8] Most of the funding for these projects came from the federal government, under authorizations from the Cooperative Research Act or, in the case of foreign languages, the National Defense Education Act. The latter was passed in 1958 in an atmosphere of at least moderate hysteria over the Soviet Union's launching of its first Sputnik, an event interpreted by many as an indication that this country was falling behind the Soviet Union and that perhaps the quality of American education was inadequate to maintain the U.S. position of supremacy in the world.

During the '50s, and even more so in the '60s, the Office of Education was the primary source of educational R/D&I funding. This one agency controlled not only the funds targetted directly at R&D institutions but also the large sums of ESEA money available to eligible school districts who could show some evidence of program development for the economically disadvantaged. Significant funding also came from other agencies of the federal government -- e.g., the National Science Foundation, the Office of Child Development, the Office of Economic Opportunity, the National Institutes of Mental Health, and the Department of Defense. The additional R/D&I funding that came from private foundations was quite small in comparison.[9]

Clearly, then, the federal government emerged as essentially the sponsor of educational R/D&I. This overwhelming federal influence has had a major impact on system development.

Assumptions of federal policymakers about the kind of R/D&I system needed, the strategies to be used in creating that system, and the kinds of R/D&I outputs to be produced have determined the directions of system development. These assumptions, strategies and output priorities warrant some attention.

B. Assumptions, Strategies, and Priorities

a. Weaknesses of Existing Educational Research Functioning

The literature contains numerous accounts of the thinking that led to the creation of a wholly new set of institutions to carry out educational R/D&I in the '60s.[10] Several years of funding educational research under the Cooperative Research Act had produced few theoretical or empirical contributions of major significance, and little if any discernible improvement in educational practice. The outputs of educational research were assessed as fragmentary, noncumulative, and not directed toward, or organized in a way likely to affect, educational practice. There was little in the way of rigorous development (in the R&D sense) and inadequate dissemination and diffusion from knowledge producing to knowledge utilizing components of the educational system. The educational research community was oriented primarily to the value system of the university, stressing theoretical advances and publications rather than less elegant nuts-and-bolts outputs designed to improve educational practice.

b. Organizational Weaknesses as Assumed Key to the Problem

A significant part of the problem was attributed to the way educational research was organized. Prior to 1964, it was conducted for the most part by individual researchers, mostly in schools of education, devoting only a small percentage of their time to the conduct of research. Research-oriented organizational forms such as research bureaus were functioning in a number of schools of education. However, most of these bureaus were more service-oriented than research-oriented; and most functioned simply as umbrella organizations for projects of individual faculty members. There were relatively few programs of interrelated research projects functioning under bureau auspices.[11]

The focus of these analyses was on the organizational weaknesses of educational research. Other problems were noted as well -- for instance, the low prestige of educational research and the resultant difficulties in attracting the best minds to the field;[12] but organizational issues were paramount in the thinking of R/D&I policymakers at this time, and this focus determined the strategies that were evolved -- those options that were selected, and others that were closed off.

c. Mission-Oriented R&D Programs as the Solution

To overcome the fragmentary, noncumulative character of educational research, the bulk of federal funding was to be concentrated on large programs of research -- long-range, interrelated, cumulative research, development, and evaluation. To overcome the field's academic, theoretical emphasis, its concern primarily with advancing the knowledge base of educational research, and its orientation toward publications as the dominant research output, funding priorities were to emphasize problem-oriented, mission-oriented R&D programs, designed to create tested products and programs, focused on the ultimate goal of improving educational practice.[13] R&D programs were to include strong dissemination components and were to be considered incomplete and unsuccessful until they had actually achieved planned improvements in school system functioning. Since the existing institutional bases of academic research were viewed as unsuitable environments to carry out research organized in this fashion, a wholly new network of federally-funded institutions was to be created to carry out educational R/D&I.

d. Establishment of Network of R&D Centers

University-based educational R&D centers were the first new institutional form to be funded. Initially (1964-66) 10, and eventually 17 such centers[14] were created under the Cooperative Research Act, the Vocational Research Act, and other legislation.[15] The rationale for these centers was as follows: education had a weak, derivative knowledge base with few links to the disciplines and poor access to knowledge producing and knowledge applying resources. The field had been unable to attract significant talent from the disciplines. However, if educational R&D centers were established on university campuses, the field would be able to draw on the critical mass of interdisciplinary talent that is concentrated in the universities.

The R&D centers would be expected to carry out four functions: codifying knowledge relevant to particular problems and drawing theoretical inferences for the construction of models and prototypes; identifying serious gaps in existing knowledge and mobilizing university resources to fill these gaps; designing prototypes (procedures, materials, systems) to achieve specific changes; and testing prototypes sufficiently to indicate their potential and implementation conditions needed for them to realize their potential.[16] As conceived, the R&D centers were to carry out work ranging across the full spectrum of R/D&I activity -- research, development, dissemination, etc., but they were expected to be especially productive as performers of first-rate research.[17]

e. Establishment of a Network of Regional Laboratories

A network of twenty regional educational laboratories appeared next, created under Title IV of the Elementary and Secondary Education Act of 1965. As initially conceived, the labs like the R&D centers, were expected to carry out the full range of R/D&I functions as well as to provide various regional services to operating system agencies within their service areas.[18] In 1968, however, a shift in federal policy, reoriented these institutions to concentrate heavily on development work.[19]

The labs were intentionally located outside the universities to overcome three major problems posed by university settings. University values tend to favor research, and view development work with condescension. University values are perhaps even more condescending about focusing effort on such linkage functions as dissemination and implementation, which need to be integrated into development planning. And of equal significance for the conduct of the development function which generally requires full-time personnel commitments, the time of academic personnel tends to be divided between teaching and a range of other activities, leaving limited time blocks for R&D work. It was assumed that locating the laboratories outside the universities would permit recruitment of full-time personnel with fewer reservations about carrying out the development, dissemination, and implementation functions. Furthermore, it was expected that there would be definite advantages in creating wholly new, independent, quasi-public institutions unburdened by traditions, socialization patterns, and histories inimical to new working styles, new kinds of management structures, and emphasis on KP-KU integration. It was assumed too that the new mixes of personnel required by the development, dissemination, and other linkage functions would be easier to recruit, hire, and retain outside the university setting, and that collaborative relationships with school systems would be easier to develop.

f. <u>The Networks of Federally-Created Institutions: The Linear Model or Institutional Overlap in Functioning?</u>

The impression one gets from some of the literature is that a linked R/D&I system of institutions had been created with some specialization of functions and coordinated linkage of functions from research to development to dissemination to implementation. Some presentations, for instance, suggest that the regional laboratories would take prototypes developed by the R&D centers and develop them to the point where they were fully tested and proven to produce known results reliably under given implementation conditions, and could be used with little outside assistance in classrooms across the country.[20] Other documents suggest that the demonstration centers established across the country under Title III of the Elementary and Secondary Education Act of 1965 would take the innovations produced by the laboratories, demonstrate them, and serve as regional and local centers for diffusion of innovations produced by the laboratories.[21] In what others describe (or, more accurately, criticize) as the "pass-it-on", linear view of R/D&I functioning which, they argue, prevailed at the time, research and prototype development would be carried out by the R&D centers, the prototypes would be passed on to the regional laboratories where they would be developed and tested fully into usable product and program packages, and then these packages would be passed on to the Title III centers for demonstration and diffusion to school systems.[22]

In fact, those who participated in the OE planning for the laboratories and centers indicate that they had no such master plan in mind, that their conceptions involved far less specialization or linkage, and not as necessarily a linear view as their critics suggest.[23] The overlap in functioning between R&D centers and laboratories were as expected. There were R&D centers engaged in development work as well as research and prototype designs. And there were laboratories doing not only development work but also their own "development-oriented research" -- some of it more basic than applied. There were also instances of collaborative relationships between R&D centers and laboratories operating in more specialized and linked fashion, the R&D centers doing the prototype research, and the laboratories carrying out the extended development work and feeding back to R/D&I center personnel data suggesting additional research needed to facilitate product development or effectiveness.[24] The IPI (Individually Prescribed Instruction) collaboration between the Learning Research and Development Center of the University of Pittsburgh and Research for Better Schools (the Philadelphia-based regional laboratory) is one such example well documented in the literature.[25] There are other examples as well.[26] But from the perspective of OE personnel, these collaborations appear to be relationships that were applauded but not necessarily considered the model all institutions in the network were expected to follow.

g. Termination of Some of the Labs and Centers -- The End of the "Regional" Network

Regardless of what the conceptions of the original planners may have been, the actual functioning of these new institutions and the quality of the outputs they produced were causes of considerable disappointment to observers and to a growing body of Congressional, federal agency, and research community critics. We will consider some of the criticisms later. At this point, though, it should be noted that the labs and centers came under considerable attack and successive winnowing efforts in 1970, 1972, and 1974 so that there are now remaining only eight of the original 20 regional laboratories -- ending the regional blanketing of the country[27] and 9 of 17 or so[28] R/D&I or policy centers created at various times by OE.

h. Other Federally-established Networks of Institutions for Educational R/D&I

We have tried to keep our presentation simple, focusing on the institutions at the heart of the federally-funded system of R/D&I institutions created to specialize in educational R/D&I functioning. But surely no picture of the network of educational R/D&I institutions created by federal funding would be complete without mention of various other institutions that have proliferated along with the centers and laboratories. We include here the 14 Instructional Materials Centers for acquiring and disseminating materials for the handicapped and for youth; Research Coordinating Units in most states to stimulate and coordinate research on vocational education; and especially the vast ERIC system for acquiring, storing, reproducing and making available the vast fugitive literature of educational R/D&I, the ERIC clearinghouses that not only acquire, screen, and abstract materials but also produce large numbers of information analysis products, and the large network of education information centers that provide access to the ERIC system and user services tailored to users' information needs. There has been some modest degree of instability in this part of the educational R/D&I macrostructure as well as the laboratories and centers.[29] We discuss these institutions more fully in our chapter on the network of institutions that make up the educational R/D&I system.[30] The ERIC system enters into our analysis in other chapters as well.[31]

i. Summary of Key Assumptions, Strategies, and Priorities

Though we have presented only the most cursory overview of the system's history, we have devoted a substantial amount of space to it. This seemed necessary to document the kinds of assumptions and strategies that dominated educational

R/D&I thinking during the '60s, and to permit us to contrast this earlier pattern of thinking with the prevailing views in NIE's leadership. We underscore some of these points before turning to the system's history since the creation of NIE.

i. Creation of New Institutions

First, federal R/D&I planners appear to have assumed that the most critical barriers to improving educational research prior to 1964 were organizational in nature, and that the best solution to this problem was the creation of a network of wholly new institutions and organizational forms rather than working within the structures of existing institutions. The fact that the new organizational forms were bound to bring with them inherent strains and problems of their own was not sufficiently foreseen. The thinking of the '60s was predicated on a normative view of organizational design. It was not based on an understanding of the real-world context in which R/D&I systems function and the constraints posed by empirical reality[32] no matter how attractive the ideas in the plan may seem in the abstract. Consequently, institutions failed to function in the manner expected. And, as the new institutions competed for scarce funds with established, and in some cases powerful institutions with whom they had few links or shared interests, they never developed the kind of constituency they needed if they were to survive and flourish.[33] Slighted by the creation of these new institutions were not only the universities but also the State Departments of Education, the local school districts, and the powerful education interests and lobbies that could have been of some assistance in generating political and financial support for educational R/D&I.[34] This picture was complicated further by federal policies that stimulated the growth of large numbers of not-for-profit and profit-oriented corporations, with a rather substantial share of the total R/D&I funding pie flowing to these organizations.[35] rather than the universities, the States, and the local districts, intensifying even more the conflict over scarce resources.

Having selected the option of creating a large network of totally new institutions to conduct educational R/D&I, other policy options were, if not consciously rejected, effectively closed off. One such closed-off option was building an R/D&I system around whatever high power talent already existed in or could be attracted to the field. Considering the excitement created by the curriculum improvement program model of the late '50s and early '60s, it is particularly interesting that this model was rejected. That model assumed that eminent scientists and mathematicians were best equipped to develop the new instructional programs and materials needed to improve the teaching of those subject areas. The strategy revolved around attracting, and providing the support needed to keep, the best minds working on these projects. The materials were of superior quality and were produced in record time compared to the lengthy development cycles that characterize the functioning of the regional laboratories. And they were installed and utilized in large numbers of school districts across the country. The prestige of the scholars working on these projects generalized to the projects themselves and, indirectly, to development efforts to improve educational practice. Later analyses suggested that there were some unanticipated problems. The programs may have been beyond the capabilities of many of the high school students using the materials. They were designed, it was argued, with only the theoretical structure and inquiry paradigms of the disciplines in mind and insufficient attention to problems of teaching and learning on the high school level. And too, there was relatively little in the way of systematic evaluation of field tests in operational settings, with subsequent revisions, new field tests, and further revisions. Still, the instructional programs and materials produced by these eminent men must still be considered far superior to most such outputs produced before or since.[36]

The "best minds" model might have been adapted to take these subsequently discovered problems into account. Work teams might have been modified in future functioning to permit more influence from learning psychologists and gifted teachers. Development cycles including more extensive field tests and more systematic data-gathering might have been added to the operational procedures of the work teams.

Some of the initial advisers to the OE planners who created the regional laboratories had urged the creation of only a handful of laboratories rather than a vast network. Their recommendation was based on the assumption that the success of the laboratories would be dependent on the availability of critical masses of talent to staff them -- building each laboratory around an existing "center of excellence" -- and that the available talent in the field was inadequate to staff more than a few such institutions.[37] If the "best minds" model had held sway, a few such institutions might have been created in the beginning. The high quality outputs they could be expected to produce would bring prestige and added support to R/D&I activity. New talent would be attracted and trained. The organizational base could be expanded over time with the growth of the skilled personnel base of the field. Starting small, with a high level of talent, would also minimize managerial problems and permit the managerial capabilities of the federal agencies sponsoring and monitoring the system to develop gradually. Thus managerial capabilities could be developed slowly with the slow growth of the system rather than being overwhelmed by enormous demands and problems from the outset. The gradual elimination of one after another of the laboratories and centers for having inadequately fulfilled their promise suggests that those who argued for a system that started small and grew with the expansion of the talent base might have been correct in their analysis.

Educational R/D&I never did succeed in attracting large numbers of eminent scholars from other fields or the "best minds" among the graduate students selecting career options. If anything, the reputation of the field seemed worse by the late '60s than it had been before. It may well be that one of the most serious weaknesses of educational R/D&I thinking in the '60s was this emphasis on creating a large network of new institutions in accord with a normative organizational design master plan (and/or as we shall note shortly, the pressures of politics) rather than developing a small system around the existing talent base and letting it grow with that base. The consequences of this approach continue to be felt today as a serious constraint on policy formulation and R/D&I functioning.

ii. Creation of Institutions External to the Operating System

A second point that needs to be underscored about the '60s and early '70s period is that the network of institutions created by federal R/D&I strategists was almost totally external to, and separate from, the operating system. There are at least two possible explanations of why this external approach was taken.

One explanation is at the heart of much of what Dershimer has described in his history of the federal role in institutionalizing educational R&D in the '60s. The federal strategists who planned and managed the federal sponsorship of these new institutions were themselves outsiders to the OE establishment and outsiders to the field of education and the established earlier relationships between OE personnel and practitioners or their allies in teacher training institutions, state departments of education, and other supporting structures of the operating system. Not only were they outsiders, but they tended to view the whole operating system and its supporting networks, as well as the educational research community, as generally incompetent, or at least unable to bring about the kind or the quality of changes the new OE personnel saw as needed. Thus, they were generally oriented toward starting anew, with establishment of new institutions, staffed by new personnel, using new approaches.[38] Little attention was focused on what already existed, especially in the operating system, that might be significant foci or might even be usefully integrated with, the new system.

There is another possible explanation for this orientation toward an external, R&D-type approach. The prevailing assumptions in OE in the '60s apparently reflected the dominance of a science viewpoint in federal R&D since World War II and the postwar formulations of federal science policy.[39] This science viewpoint is in sharp contrast to the more market-oriented or user-oriented strategies that have achieved substantial prominence in current educational R/D&I initiatives.[40]

As applied to education, the science viewpoint meant that the problems of educational practice were attributed to inadequacies in the knowledge base of the field and the quality of available programs and products for use in the schools. Researchers and other experts (rather than practitioners) were assumed to be best equipped to determine the needs to be met by the R/D&I system, and to organize and carry out R/D&I activities to meet these needs. High quality products could be produced most efficiently and effectively, it was argued, if critical masses of talent in specialized areas were assembled to work together on large scale projects providing extensive testing under varied implementation conditions. The high development costs of this approach could be overcome by nationwide dissemination of system outputs, resulting in a low per unit cost for the finished package. Concentration of critical masses of talent would not only speed and enhance the quality of product development, according to this view. It would probably also enhance the development of the knowledge base of the field.

Several problematic aspects of this view were ignored. Were R&D personnel really better equipped than user system personnel to define user system needs? Did R&D personnel have sufficient understanding of user system conditions and constraints to develop products that would adopted enthusiastically or implemented effectively? Given the chaotic nature of the educational marketplace, could externally-developed R&D products be marketed effectively enough to insure widespread adoption and implementation and therefore make up for a product's high developmental costs? Given the complexity of educational innovations and the considerable difficulties faced in getting externally developed innovations adopted and implemented in school systems, how reasonable was the concentration of resources on external R/D&I? Given the substantial amount of genuine innovation that is found in many school systems -- albeit generally undocumented and relatively underdeveloped innovation -- might not the user system be a natural institutional base for R/D&I activities? And so on. The external R/D&I strategy tended to take the user system for granted as the last link in the pass-it-on chain of R/D&I, without adequate attention to its potential for functioning in a KP as well as a KU capacity, and without adequate comprehension of the complexity of the dissemination/marketing, acquisition, and the implementation/utilization functions for externally-developed R&D outputs.

iii. Minimum of Planning

Our third major point is that this network of institutions was created and began functioning with a minimum of planning, without adequate consideration of the functional requirements of such a system, without formulation of an overall R/D&I strategy, or elaboration or communication of goals, or development of a consensus among R/D&I personnel about these goals or OE expectations about how they were to be achieved.[41]

Federal officials were not wholly to blame for this situation. Political pressures were enormous. There was pressure to get the system operational and visible, and to produce immediate, observable, quick-payoff outputs and benefits.[42] Much the same pattern could be seen in the establishment of the Community Action Agencies (CAAs) at this time as the organizational vehicles of the poverty program. The advice of experts to create a few well funded and strongly staffed centers and laboratories (or CAAs) was ignored in favor of a more political approach, spreading large numbers of such organizations across the country to be clearly visible to various constituencies.[43]

The need for a period of goal elaboration, strategy planning, and adequate staffing and organizing was ignored as well. Long-term capability-building programs to develop the R/D&I system were given minimal support in comparison to the funding of short-term product and program development. Quick results and achievements were emphasized over the kinds of long-term system-building programs that might produce more significant outputs and benefits in the future. Consequently, the system remained weak in its knowledge and technology base, its personnel, its information flow patterns and communication networks, its funding, etc., and it failed to develop the kind of constituency and political support so essential to its long-term survival.

The analogy between the educational R/D&I laboratories and centers, on the one hand, and the poverty program's CAAs, on the other, suggests another historical point that should be made. Social reform in this country seems to ebb and flow in cyclical fashion, with periods of reform followed by disenchantment and conservatism, consolidating gains and resting from the turbulence of the reform years. The educational R&D laboratories and centers were created, along with the CAAs, during one such reform upswing in the cycle. Those historical circumstances surrounding the system's birth were of some significance for its future. Institutions created in reform periods benefit from the high hopes and expectations of the historical milieu out of which they emerge. But they are fragile, and are equally likely to suffer from the general atmosphere of disillusionment and reaction that sets in with the cyclical downswing. If they survive the downswing and become part of what is consolidated in the respite before the next reform period, their long-term prospects are enhanced.

Educational R/D&I appeared until a year or so ago to still be teetering on the brink. OEO and the CAAs failed to survive the period of disillusionment and reaction. Educational R/D&I was given a reprieve by being transferred from the control of OE in 1972 to a wholly new institution, the National Institute of Education (NIE). It seemed early in the history of NIE that this reprieve was only temporary. We turn now to the history of educational R/D&I under NIE leadership over the last five years.

2. The NIE: Early History

The federal government remains the primary sponsor of, and dominant influence on, the development of the R/D&I system in education. But the direction of system development under NIE auspices has been somewhat at variance from the previous OE pattern. The literature produced by and about NIE suggests that the NIE policymakers have held rather different assumptions about the nature of the R/D&I system needed and the strategies required to create that system.[44] One of NIE's more substantial achievements to date -- with perhaps the most fundamental and long-term implications for system development -- may well be this rethinking of fundamental questions and reconsideration of policy options that were either ignored or rejected during the previous period. But the stormy history of the early years of the Institute, and its near destruction by powerful forces in Washington, may still affect system development and R/D&I functioning for some time to come. We therefore review some of this history briefly.

NIE was created in 1972 in an atmosphere of high hopes and expectations. The Institute was created by an Administration-sponsored bill and appeared to be backed by powerful supporters. It benefited from the intended analogy to the prestigious National Institutes of Health and the National Science Foundation. The existence of a National Institute of Education was expected to overcome Congress's lack of confidence in the ability of OE to manage R&D resources, and some of its reservations about R&D in general and educational R&D in particular.[45] Creation of an Institute was expected to raise the status of educational research[46] and attract a staff of first rate scientists, social scientists, and educators.[47]

However, these high hopes were dashed quickly. Problems were encountered almost from the outset. The first source of the problem was the Administration itself. The Administration had initially called for a commitment of $150 million to NIE for Fiscal 1973. But by the time the Administration had made its budget proposals public, that figure had been cut back to $125 million, of which $80 to $100 million was needed to cover existing programs transferred to the Institute --

e.g., the programs of the National Center for Educational Research and Development, the experimental schools program, and the career education program.[48] The Administration delayed for months in selecting Tom Glennan as the Institute's Director, then additional months in appointing the National Council on Educational Research, which was legally the body given policymaking authority for the Institute. Consequently, it was difficult for Glennan to give Congress an unambiguous picture of the Institute's plans and policies in the absence of a functioning Council to authorize proposed plans. Congress expected the Institute to take a strong leadership position, and instead plans had to be described tentatively and speculatively. When the appointments to the Council were finally announced and included only one eminent researcher among 15 appointees,[49] whatever high hopes the R&D community might have had for the Institute seemed mocked. Some accounts suggest that the difficulty in finding eminent researchers to appoint to the Council was finding eminent researchers who were also politically acceptable to this Watergate-era Administration.[50] Whether or not this was true, the quality of the appointments made suggested that the Administration was no longer to be considered among the friends of the Institute, who were fast shrinking in numbers.

The most serious problems were encountered in the annual appropriations struggles with Congress. The Administration's initial NIE budget request for Fiscal 1973 was $125 million. But by the time this passed the Congressional appropriations hurdle, the appropriation actually made was $106.8 million. Since $80 to $100 million was needed to cover existing obligations to OE programs transferred to the Institute, this provided relatively little "new money" for the Institute to develop new initiatives and a program of its own.[51] But that was a honeymoon situation compared to the budget allocations for the Institute in Fiscal 1974 and Fiscal 1975 -- $75.7 million and $70.0 million respectively. These 1974 and 1975 figures represented the smallest federal allocations to educational R/D&I since the system was created a decade earlier. As described by Congressman John Brademas (D-Ind.), a friend of the Institute and of educational R/D&I, the Fiscal 1974 budget fight provided an unmistakable clue that NIE was in trouble: "That the $162 million recommended by an anti-education Administration should have been reduced to $75 million by a Congress that consistently votes more money for education that the President wants is dramatic evidence of these troubles."[52] One writer who has been following NIE's appropriations difficulties for the AERA's monthly Educational Researcher described the situation in these terms: "It has been a painful process for the Institute to see a $162 million budget request for Fiscal 1974 get shaved to $142 million by the House, then dive to $50 million during the deliberations of the Senate Appropriations Committee, and finally emerge from the Senate at $75 million."[53]

The Fiscal 1974 cuts were devastating. But the Fiscal 1975 appropriations crisis was nearly the Institute's death blow. The $130 million requested was reduced to $100 million by the House Appropriations Committee, and reduced further to $80 million in the bill initially passed by the full House. But most serious of all, the Senate Appropriations Committee recommended zero funding for Fiscal 1975 and this was reflected in the Senate-passed bill. Final determination of a compromise figure was left to the House-Senate conferees on the bill. If the compromise had been a $40 million averaging of the two recommendations, this would have covered only existing obligations and would have meant essentially a phaseout of NIE.[54] As it turned out, the final figure appropriated was around $70 million and the NIE appropriation stabilized around that figure for Fiscal 1975, 1976, and 1977, with a significant increase to nearly $90 million for Fiscal 1978. It would seem, then, that the worst is probably over, and NIE's future appears to be assured. But clearly, the real threat of a phase-out so early in the Institute's history had a major impact at the time, felt over the short run in the resignation of Tom Glennan as NIE's Director, followed by resignation of the Chairman of the National Council on Educational Research in protest over Glennan's resignation. And too, it should be noted, the size of NIE's appropriations, considerably smaller than NIE's planners had anticipated or that NIE's leadership requested each year, has been a critical continuing constraint on the Institute and its program planning.

Why did NIE encounter such difficulties and make such powerful enemies? Clearly, much of the problem predates NIE. Educational R&D has had powerful enemies for some time, in the Congress, in the Office of Management and Budget, and in the Office of Science and Technology.[55] But equally clearly, NIE did a poor job of developing support in Congress and in developing a constituency among, or even significant links to or support from, researchers and powerful education interests.[56] There was little contact between NIE staffers and Congress during the critical early period. Glennan decided to let the liaison work be carried out by HEW's liaison staff rather than diverting his own staff's energies to this critical function. Consequently, small problems that were not attended to became big problems, and the Institute's leadership was unaware of the developing problems until they were overwhelmed by them.[57] And the educational research community failed to provide any substantial assistance to NIE in developing support in Congress. AERA leadership charged that educational R&D was being "politicalized" -- that political considerations were outweighing technical ones.[58] But AERA did relatively little to mobilize its membership during these early years, and has only recently begun working on a political liaison program to improve the political environment of the educational R/D&I system.[59]

NIE's budget problems inevitably necessitated cuts in programs and reorganizations of the Institute's internal structure, continuing the overall structural instability that characterized the OE years.

If NIE was to "free up" any funds for new initiatives of its own, the Institute was forced to find ways to chop existing programs. Inevitably, this would alienate parts of the R/D&I community hurt by the cuts, further complicating the Institute's political problems.[60]

3. NIE Leadership: Assumptions and Strategies

Despite these difficulties, there has been some first-rate thinking going on inside the agency -- a fundamental reassessment of the R/D&I assumptions and strategies of the '60s, and the formulation of an important agenda for R/D&I system evolution while directing R/D&I resources to some important needs of the educational system. We base our evaluation primarily on the examination of NIE documents describing rationales, proposals, and funded R/D&I activities.[61] Documents can be misleading in suggesting more order, consistency, and interrelation of ideas and activities than exists in reality. Still, they provide the best information available to us, and are, at any rate, interesting in their own right.

We noted earlier that the federal R/D&I strategy in the '60s focused on creating and operating a network of wholly new organizational forms and institutions external to the operating system. Much of the thinking appears to have been premised on a linear, "pass-it-on" model of R/D&I functions that placed the new network of external R&D institutions at the active, knowledge and product producing end of the KPU spectrum and placed the operating educational system at the passive, target end of the spectrum. The key barrier to the improvement of educational practice was assumed to be an inadequate supply of well developed, fully tested and validated programs and products for use in the operating system. Therefore, the strategy focused on creating and supporting new institutions that would specialize in developing and testing such products and programs. Widespread adoption and effective implementation of these externally developed products were assumed to follow inevitably from their availability, and little if any thinking was directed at operating (i.e., "user") system problems inherent in external R/D&I strategies.

We get a rather different picture from our reading of the NIE literature. The literature suggests a more comprehensive approach to the education sector as a whole. Clearly, it represents an effort to restore a more balanced judgment of the diverse sources of weakness and potential strength in the education sector and the range of interrelated leverage points providing opportunities for policy intervention. Also, from the very outset, statements by NIE's leadership set a less doctrinaire tone, a more experimental (but systematically experimental) approach to the determination of strategies and methodologies for both solving educational problems and building an R/D&I system.[62]

A. More Balance Between KP and KU

The educational R/D&I strategies of the '60s focused largely on KP functions -- e.e., on research and development. While research and R&D activities are still central to the programs funded by NIE, and continue to receive the bulk of the Agency's budget,[63] federal education policy (as reflected in the programs of NIE as well as other federal agencies such as USOE)[64] places more emphasis than ever before on dissemination of externally produced programs and on developing internal operating system capabilities for identifying problems, developing solutions, and effectively implementing and utilizing innovations, products, programs and the like, whether developed internally or externally.

a. The Importance of Dissemination and Linkage

Illustrative of the importance NIE has come to attach to dissemination was the tripling of the Institute's allocation for its dissemination program in its Fiscal 1976 budget request[65] and the following Dissemination and Resources Group program description from the FY 1978 Program Plans:[66]

> Problem Statement: Schools and students have derived relatively few benefits from the results of research and development. Because information about newly acquired knowledge and better instructional methods does not generally reach teachers and administrators in a timely fashion, the education system is often slow to implement useful innovations. Improved communication and linkage between the research community and organizations -- State, intermediate and local education agencies, teacher education institutions, professional associations -- serving educators in the field are needed to speed the flow of new ideas into practice.
>
> Program Purpose: To improve the dissemination and use of knowledge for solving educational problems;
>
> Assuring access to available knowledge resources: Programs in this area are concerned with providing the education community a wider range of knowledge resources about education, and with making this expanded knowledge base more accessible and easier to use. Knowledge resources include both the general type that provides assistance in confronting a broad range of issues in education, and the targeted type that provides information on specific topics.
>
> Specific activities include:
>
> > Continuing and improving the ERIC system
> >
> > Identifying and cataloging of R&D outcomes; development of interpretive analyses on how these outcomes can be used to improve educational practice . . .

Strengthening linkages between R&D and practice. While the objective of improving linkages between the many components of the education and research communities is at the heart of most of the Group's activities, this strategy is concerned specifically with linking research and practice in order to help education practitioners to identify, examine, and effectively implement R&D-based solutions to high-priority educational problems.

Specific activities include:

R&D utilization program--local, intermediate, and State education agencies, R&D organizations, and institutions of higher education work together to provide technical assistance to local schools.

R&D dissemination and "feed-forward" system (now referred to as the R&D Exchange program) -- R&D organizations cooperate in providing client-oriented information describing available R&D products to schools and in assessing the impact of R&D on users.

A project to coordinate and synthesize training materials for linking agents and to conduct pilot training programs.

b. Development of Internal Operating System Capabilities

The Institute's concern with developing internal operating system capabilities in problem definition and solution is evident in several of its programs. As described in 1978 Program Plans:[67]

State and Local Capacity Building: The Institute is committed to strengthening the R&D utilization and performance capabilities within local schools, school districts, and State education agencies. Few states and fewer districts and schools have R&D capabilities as these functions are traditionally defined. In addition, local use of the results of a decade of Federally-supported R&D has been disappointing. To address these issues, NIE will increase its assistance to State and local agencies in developing their capacity to:

Improve their problem-solving processes;

Evaluate and utilize R&D products developed elsewhere;

Undertake comprehensive program change; and

Respond systematically and knowledgeably to policy issues of local, State, and national importance.

Highlights of FY 1978 Program:

Continue to build dissemination capacity through support of up to 40 State agencies and modest support of other selected education organizations.

Building capacity in the education system: Programs in this area are presently concerned with increasing the capacity of State education agencies to disseminate and use knowledge. Capacity-building programs are now being extended to other settings.

Specific activities include:

State dissemination capacity building.

Capacity building in other settings -- education associations, community colleges, teacher education institutions, large school systems.

Dissemination leadership program.

Training and technical assistance for minorities to increase their participation in the production, dissemination, and implementation of education R&D.

In addition, NIE's Local Problem-Solving Group funded: (a) nine innovative projects in urban schools designed to increase their capacity to solve problems, and (b) a documentation and technical assistance project designed "to document the activities of these sites and attempt to use directly the knowledge gained from the documentation to help other urban schools to improve their capacity for problem solving."[68] The latter Documentation and Technical

Assistance program is ambitious in conception, concerned as it is with:

> <u>Documentation</u>: To develop a data based definition and analysis of local capacity for problem solving in urban schools.
>
> <u>Technical Assistance</u>: To develop through practice effective ways to help local urban schools build a sustained organizational capacity to solve problems.
>
> <u>Linkage</u>: To connect the documentation of the nine problem-solving projects funded by NIE with DTA technical assistance efforts and to study the connections to learn how educational research and practice can better inform each other.[69]

The contractor's implementation of the program, however, has not lived up to these high expectations.[70] Still, the program is important for demonstrating NIEs commitment to strengthening local school capacity for problem-solving and for its interesting research-on-research design.[71]

c. <u>Summary</u>

Clearly, then, the NIE strategy takes a much more balanced approach than the previous OE strategy to the support of internal and external R&D resources, and to funding of both KP activities (whether internal or external) <u>and</u> linkage and support functions required to improve product dissemination, delivery, acquisition, implementation and utilization.

B. <u>Balance Between Working with Older and Newer R/D&I Institutions: Work with SEAs and LEAs, Teacher Training Institutions, and Education Associations</u>

In addition to a greater balance between KP and KU functions in the programs currently receiving support, there is a second important related point of contrast between the OE and NIE R/D&I strategies. While thinking during the OE years focused largely on the new institutions created by federal funding to carry out R&D functions, the NIE strategy places a good deal of emphasis on working with and through the older institutions that were largely ignored by the OE R&D strategies. Working with and through state departments of education and local school districts is a pattern of special importance to the NIE strategy. As described in one NIE document:

> NIE strategy recognizes that the State agencies are in a key position to build an effective, dissemination system in education. The States are legally responsible for education in the United States; they are unique in their ability to allocate a range of resources for regulation, finance, and leadership in education; and they are in a strategic position to link the R&D community to a substantial majority of educational practitioners . . . we will be working with the States and others to analyze and catalog available research knowledge, products, and exemplary local practices; to train intermediate agents within the States who can help schools apply that knowledge; and to make available the technical resources of R&D organizations to help schools establish new programs or practices based on that knowledge.[72]

Another NIE document takes note of the increasing leadership role exercised by more and more State Education Agencies over the last decade, including such functions as needs assessment and long range planning, identifying and diffusing successful innovations, and providing information services and technical assistance.[73] The NIE strategy is designed to support and strengthen the states in these efforts, as a means of building on an existing resource base and therefore stretching the effect of the federal money invested in dissemination. The strategy is expected to be more cost effective in the long run, and probably more effective in impact regardless of costs because of the added possibilities of providing services through the states that are tailored more adequately to local district needs. This point is made in an NIE document describing the Consumer Information Component (now part of the R&D Exchange Program) and the R&D Utilization Component of NIE's dissemination program. The general strategy is described as:

> a linkage strategy, building upon the work of existing dissemination programs and agencies rather than creating new ones; this has resulted in activities that can be combined with existing programs, and activities that capitalize on shared resources, collaborative efforts, and joint funding . . . The objectives of either component could be managed centrally, by NIE, or could be addressed and managed separately by state and local agencies. The design proposed by this program is to adopt a mixed approach in which the resource-based objectives (Consumer Information Component) are coordinated centrally with input and help from the field, while the utilization support objectives (R&D Utilization Component) are predominantly coordinated by state and local agencies with advice and counsel from NIE. This mixed approach was adopted to reflect the tradeoff between the importance of insuring that everything is directly related to each user's needs and efficiencies of scale and benefits of mutual collaboration possible when all are addressing a similar problem. It is thought that the advantages of mutual collaboration and the potential for efficiencies of scale are more likely to appear in building the resource base; there is not as great a likelihood of them appearing in the implementation work. In addition, a centralized management approach is more susceptible to failure by not reflecting the needs of individual clients and situations involved in the utilization activities than the resource base activities.[74]

Rather than assuming that the best solutions will be developed by researchers and experts in specialized external KP facilities such as the centers and laboratories, the NIE strategy has provided substantial support for locally developed innovations and local innovation and innovation-support processes as important alternative sources of innovation, and perhaps more cost-effective sources as well. Therefore, by building on existing resource bases throughout the operating as well as the R&D systems in education, NIE expects to develop a more integrated, more practice-oriented, and clearly more decentralized and market-oriented structure. Instead of viewing R&D resources as concentrated in a relatively small network of R&D institutions external to the vast operating system of 50 State Education Agencies, 17,000 or so school districts, thousands of professional and lay organizations concerned with education, etc., all institutions and groups within the education sector and its environment are viewed as potential bases of the KP as well as KU and linkage resources and activities. Thus 1978 program plans of the Institute include support for capacity-building and other programs in State Education Agencies, local school districts, teacher education institutions, community colleges, and education organizations.[75] The notion of critical masses of scientific talent is not displaced in the NIE strategy -- most research and R&D grants and contracts are still awarded to the universities and specialized R&D institutions. But, in addition, we see programs designed to mobilize other bases of organizational renewal -- e.g., teachers (teacher centers and advisories) and parents (parents advisory groups and parent information centers).[76] In addition to dissemination strategies designed to increase information flows among research and R&D personnel, and between the research and R&D communities, on the one hand, and operating system personnel, on the other, NIE documents have expressed interest in strategies designed to create informal communication networks among school systems sharing interests in particular approaches, strategies, etc. (e.g.: creating networks of teacher centers, other networks of rural education helping agencies, and still other networks of parent information centers).[77] If such networks can be created over time, and perhaps be linked up to each other and the various resource bases for educational R/D&I and organizational renewal, this approach may prove to have been the key to stimulating KP-

KU integration and system maturation. (We have noted here only those instances where NIE has opted to work with these various operating system organizations or institutions closely related to the operating system. If one were to analyze current OE R&D-related programs, numerous additional examples could no doubt be cited.)

C. Long-Range Strategy Formulation and System Building

We should mention one final point of contrast between the OE and the NIE years. We noted previously the inadequacies of goal elaboration, strategy formulation, and planning during the OE years. That these criticisms have been heard less frequently in the NIE period may be an indicator that a certain amount of system maturation has taken place, especially in macrostructure management on the federal agency level. In comparison to the OE years, NIE's leadership has shown greater understanding of at least some of the fundamental requirements of R&D systems and their attendant management needs. NIE documents demonstrate that the agency's staff have done a substantial amount of thinking about the long range needs of the R/D&I system and staged strategies to push that system toward maturation. By their statements and their actions, NIE officials indicated their concern with bringing some stability, continuity, and gradual evolution to the system's structures and programs. Glennan, for instance, commented at a number of points on the need to stabilize signals from Washington to the field, and to provide continuity by resisting the tendency to create and then destroy programs in favor of new programs. He argued that long-range stability could be provided by resisting "hastily conceived solutions," making clear to Congress and the public that complex educational problems could be solved but would require far more time than they had assumed, emphasizing long deliberation and planning of program initiatives with the with the research community, and emphasizing scientific rigor rather than haste in the conduct of R&D programs.[78] Both the planning staff for the Institute and NIE's initial leadership emphasized starting small and expanding gradually with the development of new capabilities, rather than absorbing so many diverse programs and starting so many initiatives at once that the system's management capabilities and resource base would be overwhelmed and inadequate.[79] The Institute's 1978 program plan gives prominent mention of "programmatic and organizational stability" as an important development in NIE's brief history and "long-range planning" as an area of special emphasis.[80]

And perhaps most important of all, NIE's staff took seriously its legislative mandate to "build an effective educational R&D system." Their program agenda reflected concern not only with carrying out R/D&I activities to solve educational problems and to produce visible results, but also with developing the R&D system itself -- its resources and capabilities, and a sufficient understanding of system functioning to permit more effective NIE management of the system.

This brings us to NIE's R&D System Support Program. Our analysis has been funded by this program. The program has been described by NIE as follows:

> This program . . . encompasses three interrelated goals. The first is to build a systematic data base concerning Knowledge Production and Utilization (KPU) in education. This will be done through compiling and modifying data from existing statistical systems and through designing and conducing new periodic surveys and special purpose studies.
>
> The second function is analytic. The data base will be used to monitor educational change and to develop models of the knowledge production and utilization process leading to a greater understanding of system dynamics. The program will plan a series of regular reports which

> will describe the status of the R&D system and the educational system and the changes taking place in those systems. . . . Through the analysis function it should be possible both to identify problems requiring NIE attention, and to provide analyses of policy issues identified by others. Finally, it should be possible to identify areas of imbalance or weakness in the KPU system for which NIE support activities are needed.
>
> The third function of the unit is to design and manage specific programs for strengthening the KPU system. Such programs are conceived of along four dimensions: the institutional base, the personnel base, the technologies for conducting KPU, and the facilities and equipment infrastructure. Inasmuch as other NIE programs will be responsible for efforts to improve the linkage and utilization components, the initiatives of this program will focus largely on support for research and development components.[81]

We view the inclusion of this kind of program in the Institute's planning as one of the most hopeful signs of movement in the direction of system maturation. Once the proposed monitoring system is operational, and an empirical data base is available to test the effects of policy initiatives throughout the system (both those effects intended and others unintended), NIE, working in coordination with other agencies and the field, will be in a better position to manage the system's development and perhaps speed its maturation.

4. NIE as "Think Tank", "Lead Agency", or "More of the Same"?

If the thinking reflected in NIE documents is so much more balanced and reasonable than the assumptions and strategies that prevailed in the '60s, why was the Institute in such trouble during the first three years of its history? Why were so many powerful voices calling for its phase-out and a restoration of OE control over educational R&D policies and programs? And what has happened since?

We have already taken note of NIE's political troubles in the early years -- its failure to maintain strong support in Congress and develop a strong constituency within the research and R&D communities and among the powerful education interests and lobbies, many of whom had strong ties to the OE bureaucracy.

It is also worth noting in this connection that Richard Dershimer's argument about technocratic politics seems valid here.[82] NIE came into being because powerful forces within the Administration were pushing for it. After its creation, however, the political winds had changed and the agency had relatively few influential friends close to the Administration or the major wielders of power on education legislation in Congress.

But beyond this, and adding to the agency's difficulties, the Institute never became the Think Tank of eminent researchers, R&D specialists, and educators that its most hopeful proponents expected it to be. As described when NIE was still in only the talking stage, the Institute was to have a permanent staff of scientists, social scientists, and educators and an influx of top people from the field joining the staff for a few years to work on particular programs.[83] A small, undersupported internal research staff was recruited, but this Basic Studies Group generally lacked visibility and, before being disbanded, devoted much of its time to such functions as "staying on top of projects," and organizing invitational conferences of leading scholars in important research areas "to identify disciplinary research needs," develop research agendas,[84] and, hopefully, attract some of these eminent researchers to apply for grants and carry out contract work under NIE sponsorship.

As yet, however, NIE does not appear to have attracted a large supply of eminent scholars from the disciplines to work on educational R/D&I or to serve on NIE's policymaking body, the National Council on Educational

Research. Consequently, with little eminence to give prestige to the Institute and its programs and make it less vulnerable to attach, educational R/D&I critics could attach it as "more of the same, but worse" -- worse because its leadership failed to understand its political environment and the problems it posed, and lacked the political skills to overcome these problems; worse, too, because it made new enemies of those whose interests were hurt by the transfer of R&D programs from OE, especially those whose programs were eventually dropped by NIE. Had the Institute become a Think Tank of first rate leaders of the research community, or attracted the strong backing and vocal support of such a charmed circle, the story might well have been different.

The Institute's political situation has clearly stabilized: its existence is no longer threatened and its Fiscal 1978 budget has been substantially increased over previous levels. At even the higher new funding level of roughly $90 million, the agency may simply be such "small potatoes" that few of those with power or influence care much one way or the other about its existence. However, whether or not NIE can assume the "lead agency" role for educational R&D that seems implicit in its legislative mandate to "build an effective R&D system" is still open to question. We shall return to this point later in this chapter.

We have considered the history of the last two decades in some detail. We now abstract from that history a number of points that help us to understand the present state of historical development of the system, and especially some of the key problems in current functioning that block system maturation and therefore suggest needed policy initiatives for the future.

III. THE HISTORICAL PRESENT: THE TRANSITIONAL PHASE OF DEVELOPMENT

Our previous analyses have provided some descriptions of the phases of historical development of R/D&I systems, as we have conceptualized them. We have described the introductory phase of development as the initiation period following the system's birth. We noted that this period tends to be characterized by an initial "missionary" surge preceding "disenchantment and a downturn that sometimes results in 'death'." We described the subsequent transitional phase of development as "a set of changes which occur in developing this new activity from a status that is experimental, tentative and possibly declining to an expanding, accepted and integrated activity . . . within its own context."[85] There is room for some disagreement as to how "experimental" and "tentative" the system still is, and the extent to which it is now an "expanding, accepted and integrated activity . . . within its own context." But clearly the federally funded part of the system has gone through the part of the cycle described as "disenchantment" and "downturn," and come dangerously close to a premature death. And there is abundant evidence of extensive activity oriented toward expansion and integration of KP and KU functioning, both central to our definition of the transitional stage of development. Equally clear, educational R/D&I has considerable development to undergo before it approaches our conception of an effectively functioning mature R/D&I system, i.e., a system that demonstrates the following attributes:

1. a network of stable institutions which are properly attuned to their various functions (research, development, dissemination, etc.), and appropriately linked to each other and to the operating system;

2. qualified personnel in sufficient numbers, properly distributed and focused on appropriate programs;

3) visibility and legitimacy among the various R/D&I system stakeholders;

4. adequate and stable levels of funding;

5. a strong knowledge and technology base; and

6. system managers, decision makers, and policy makers who have relevant management and policy training and skills.[86]

If we are correct in our interpretation of the available evidence and in our understanding of the stages of historical development of R/D&I systems, then a case can be made for the desirability of certain kinds of policy options and strategies rather than others at this particular point in time.

First, let us consider some of the available evidence. We consider evidence on seven criteria useful for judging the stage of development of a given R/D&I system: the age of institutionalized R/D&I in that sector; its knowledge and technology base; the stability of its structure; its resource base (i.e., its personnel and funding); patterns of functioning; the degree of integration between KP and KU functioning; and the quality of system outputs.

1. The Age of Institutionalized R/D&I in Education

A. Linked R/D&I

Institutionalized R/D&I in education is little more than a decade old. The development of instructional strategies and learning materials has been going on as long as there have been teachers and students. But new to the field of education is the development function defined in the rigorous R&D sense as the production of tested products or strategies with known outcomes, developed and refined through iterative cycles of design, development, testing, evaluation, revision, etc.[87] New is institutionalized, linked R/D&I, as an interrelated set of processes revolving around the development function -- research-based development, development-oriented research, development linked to dissemination and implementation,[88] etc., carried out by specialized personnel under specially designed organizational arrangements.

While the newness of a system may not be significant in itself -- few institutionalized R/D&I systems in any sectors are more than a few decades old -- it is a factor of some significance when compared to the centuries of history and tradition that characterize the operating system of educational institutions. This is in sharp contrast to a sector like aerospace where the operating and R/D&I systems matured to a significant degree together, and were therefore open and receptive to interaction and mutual influence. The operating system served by educational R&D is old in history and heavily laden with traditions, norms, and values that run counter to acceptance of the outputs of external R&D. The educational R/D&I system has not yet established its legitimacy. It competes against traditional approaches to producing knowledge, products, and programs for educational institutions, and it uses scarce resources. Its methods and outputs have not yet proven their superiority to traditional methods or outputs. In many cases, the products of educational R/D&I are clearly inferior to conventionally developed products.

The historical milieu in which the educational R/D&I system emerged contributed to its problems in gaining acceptance by operating system personnel. Unlike the relatively close synchronization of the historical development cycles of the operating and R/D&I systems in a sector like aerospace, educational R/D&I was born at a time when school systems were often characterized by critics as obsolescent and in a state of organizational decay. School professionals in the '60s were targets of intensive attack,[89] which made them understandably more defensive and resistant to encroachments from outside experts whose very existence with government support was interpreted as a slighting of the competence of educational practitioners.

These legitimacy problems for external R/D&I would seem to suggest the advisability of funding efforts to strengthen internal operating system capabilities for identifying problems and developing solutions. And indeed, some relatively sizeable allocations have been directed toward this aim. It will take some time before clearly, institutionalized patterns for internal R/D&I emerge. Indeed, it may be necessary for us to rethink what "institutionalized" R/D&I means when it is internal to an operating system and not necessarily manifested in full-time specialized roles. But clearly, however long practice-based development work has been going on, conceived now in terms of identification and perhaps validation, packaging, and dissemination of exemplary practices,[90] this pattern of functioning is quite new to the field of education.

Certainly, then, given the newness of institutionalized R/D&I functioning in the education sector, the fact that educational R/D&I shows few signs of maturity should not be viewed as surprising or alarming.

B. Individual Functions

Much of what we have said about institutionalized, linked R/D&I

in education holds equally well for the individual functions that make up an R/D&I system. Many functional specialties of mature R/D&I systems are almost totally absent in education. Those that do exist either emerged as areas of specialization after the R/D&I system was institutionalized in the mid-'60s, or were wholly transformed by the demands of that system. These functional specialties as they are carried out in the R/D&I system exist alongside of, and compete with, these various activities as they are carried out in other, older parts of the education sector. A few words would seem to be in order about each of these functional specialties.

a. Research

Systematic educational research in this country has been dated as far back as 1895.[91] But until stimulated by the infusion of federal funds in the '50s and '60s, the educational research community remained relatively small in numbers, fragmented and unorganized, functioning mostly as individual researchers, doing small-scale, non-cmumulative research, primarily in schools of education.[92] The field has experienced enormous expansion since then,[93] and considerable structural change intended to overcome these weaknesses.[94] But the new pattern of long term, team research programs coexists with large numbers of small-scale one-shot studies[95] -- the familiar older pattern the educational R/D&I system was intended to replace.

Institutionalized educational research, then, may not be new, but programmatic research of the type emphasized by federal funding policies is new. It is still fledgling in status, has not won total acceptance within the research community, and has met some significant resistance for a variety of reasons -- at least some of which have some merit.[96] And regardless of how much of the current output of the research community is programmatic in nature and how much tends to be of the one-shot variety, our analysis of the conduct of educational research suggests that the educational research community has failed to come to grips with some of the critical problems that prevent it from improving the quantity and quality of knowledge production and knowledge utilization to improve educational practice.

b. Evaluation Research

Evaluation of educational programs is hardly new. But evaluation emerged as a specialized R/D&I function with distinctive concerns and a distinctive methodology only with the institutionalization of education R/D&I in the last ten to twelve years. Prior to that time, evaluation of educational programs, when it was done at all, was carried out by educational practitioners and some eeucational researchers. It was rarely systematic, and tended mostly to be normative. The predominant approach was casual observation and analysis. Conclusions tended to be based on expert opinion and intuition rather than systematically gathered and rigorously analyzed empirical data. This pattern changed significantly in the '60s as large-scale, federally funded social programs proliferated, and the legislation that created them tended to require the systematic gathering, analysis, and reporting of empirical data on program effectiveness. The evaluation function expanded rapidly as a new specialty,[97] and even as a new industry.[98] But, as in research, old and new patterns of evaluation functioning coexist and compete, and the immaturity of the field is still evident in the literature as evaluators grope to overcome the conceptual and methodological ambiguities of their function.[99]

c. Development and Dissemination

The newest R/D&I specialties to appear in education are development and the dissemination/marketing function. Both have links to activities that have been carried out for some time by educators and people in the education industries. But both took on totally new meanings when understood as part of linked R/D&I processes in the mid-'60s.

Before then, educational products and materials may have been designed and undergone a few revisions, but rarely on the basis of systematic testing and data-gathering. And rarer still was development work oriented toward producing tested products that could be described in terms of specific known outcomes to be expected reliably under specified implementation conditions, or exemplary practices that could be packaged and disseminated for use by others (possibly validated in some ways as well). Dissemination, when it occurred at all, was somewhat random and chaotic, rarely based on market analysis or marketing planning, and passive in approach, leaving the burden of effort in learning about new products to acquisition personnel.

Over the past decade, development and dissemination have come increasingly to be viewed by educational R/D&I theorists as institutionalized functions, carried out or supported by specialized personnel, using carefully conceived and managed planning and implementation strategies. But there is certainly no unanimity on this.[100] Both functions are still in their infancy. The old patterns of development and dissemination exist alongside the new. And relatively few products are developed rigorously or disseminated by means of sophisticated marketing techniques. The educational marketplace is still chaotic, and the operating system still has great difficulty determining what ideas, information, products, or programs are available to meet a given need, much less how effective they are under various implementation conditions.

d. Relative Absence of Some Other Specialized Functions

This situation exists not simply because of the immaturity of the development and dissemination functions but also because of the virtual absence in educational R/D&I of several functional specialties that can be observed in mature systems. Need identification, acquisition, and implementation/utilization generally lack institutionalization in education as specialized roles, carried out by specialized personnel, on a continuous, ongoing, routine basis, using specially allocated resources and backed up by specialized organizational supports. Consequently, these processes occur haphazardly and episodically. They tend to be unplanned and uncoordinated with routine system functioning.

e. Summary

Clearly, then, whether one considers institutionalized R/D&I in terms of individual or linked R/D&I functions, we are dealing with a phenomenon that is young and shows few signs of mature functioning. Policy options and alternative management strategies must be assessed in relation to this immaturity, and the need for learning time.

2. The Knowledge and Technology Base

A. Nature and Weakness of the Base

Education is generally characterized in the literature as a field with a weak knowledge and technology base.[101] There is some disagreement as to whether it can be considered a discipline.[102] But clearly, whether or not it is a discipline, it is at best a derivative discipline generally lacking the powerful paradigms that have structured knowledge in the parent disciplines of psychology, sociology, etc.[103] One theorist, viewing education from the vantage point of the sociology of science, described education as a conjunctive domain of knowledge[104] -- a field drawing on interdisciplinary resources to solve social problems, rather than a discipline oriented toward theoretical advances to solve intellectual problems. Where problem solution is paramount, knowledge accumulation is secondary, and the advancement of the knowledge and technology base of a field is likely to be inefficient. Without concerted attention to the development of a field's knowledge and technology base, maturation of its R/D&I system seems unlikely. In the case of education, this problem seems particularly significant.

We would not attempt to appraise the present state of knowledge and technology in the hundreds of research areas actively pursued in education today, or the vast number of different methods and approaches used to conduct the various kinds of R/D&I activities. However, we have examined evidence on one indicator we believe to be useful for judging the state of development of the accumulated knowledge and technology base of the field -- the availability of handbooks and other syntheses of existing knowledge in different research areas and functional specialities. Project Hindsight[105] suggested that the synthesis and presentation of knowledge in highly organized and compressed form is critical for the cumulative development of a field. Through these syntheses the findings become widely available, enter teaching and course work, and are passed on to the newest generation of R/D&I personnel as part of the accepted knowledge base of their field. A research area has to have achieved some degree of maturation before such syntheses are produced. Therefore, we can make some broad inferences about maturation levels from the extensiveness of the available syntheses.

B. Educational Research

Using this criterion, educational research is the only functional specialty with a well developed research and methodology base, largely but certainly not totally derived from other disciplines, especially psychology and sociology. The AERA has been instrumental in producing and publishing most of the major research syntheses -- e.g., the Encyclopedia of Educational Research, produced at nine or ten year intervals and now in its fourth edition;[106] two editions of the Handbook of Research on Teaching;[107] the quarterly Review of Educational Research;[108] and the newest series, an annual Review of Research in Education, beginning in 1973.[109] Each of these volumes includes numerous high quality articles covering broad areas of theoretical, empirical, or methodological activity. Some of these pieces have been landmark articles in their own right, such as Campbell and Stanley's, Experimental and Quasi-Experimental Designs for Research[110] that appeared initially in the 1963 edition of the Handbook of Research on Teaching, and must be considered one of the most important papers to have influenced the teaching and perhaps too the conduct of educational research since then.

Still, as extensive as these syntheses may be, and as vast as the theoretical and empirical body of knowledge they bring together, the knowledge and technology base of the field can hardly be judged to be mature. As we noted earlier, despite the vastness and perhaps even unwieldy size of the literature, it has enormous gaps. It generally lacks powerful theoretical and inquiry paradigms. And only a relatively small portion of it is development-oriented in nature or directly applicable to development of product and program prototypes or implementation supports. Using our same criterion of maturity (the availability of syntheses of a field's knowledge and technology base), the general lack of such syntheses for research that is directly applicable to development and implementation needs suggests the relative immaturity of research as a function linked to and supporting the educational R/D&I system.

C. Evaluation Research

The evaluation and dissemination functions have generated a substantial literature over the past decade, and a few important syntheses of the existing knowledge and technology base.[111] But these are relatively few in number and small in scale in comparison to educational research, and they have been published as outputs of one-time rather than ongoing (annual or decennial) projects. This can be considered at least suggestive that the accumulated and accumulating knowledge base of these fields is far less extensive.

The early phases of the maturation process of a knowledge and technology base are illustrated with particular clarity in the enormous literature produced by the evaluation function over the last decade. Of all the functional R/D&I specialties, evaluation appears to have experienced the most self-conscious and concerted development of its methodology during this period.

The literature reflects not only the inherent difficulties of the evaluation role and evaluation processes, but also the problems of weaning a new specialty away from a parent field. The early literature was filled with self-conscious analyses drawing distinctions between evaluation and research,[112] and emphasizing the inappropriateness of prevailing research methodology for the educational evaluation context.[113] Within only a few years, the distinction from educational research was taken for granted, and the literature documented the development of evaluation as a new field with a distinctive identity.

The rapid coming of age of the evaluation function could be seen in the quick succession of seminal papers produced by evaluation theorists,[114] the publication of several anthologies reprinting important articles on evaluation,[115] the frequent citation of the seminal papers of the field and the use of concepts and approaches developed in these papers. It could be seen in the emergence of a somewhat common frame of reference among evaluation theorists and a common vocabulary -- including such terms as "formative" and "summative" evaluation[116] and "context," "input," "product," and "process" evaluation.[117] The maturation of the evaluation function could be seen especially in the formulation of various new evaluation designs and methodologies,[118] in attempts to develop taxonomies of evaluation designs,[119] and in the publication of several handbooks synthesizing and compressing the accumulating knowledge and technology base and translating it into more readily usable reference form.

Still, the conduct of educational evaluation and the quality of evaluation outputs have been the focus of considerable criticism.[121] The field still lacks an adequate theoretical base. Evaluation instrumentation is in a most rudimentary state of development. And basic conceptual and methodological dilemmas remain unresolved.[122]

Though substantial progress has been made in recent years, the knowledge and technology base of the evaluation function must still be considered immature and underdeveloped.

D. Dissemination

There is a sizeable literature on dissemination and diffusion in education, much of which has been produced by the University of Michigan's Center for Research on Utilization of Scientific Knowledge.[123] This includes one extremely useful synthesis of the potential knowledge base of the field, drawn from various disciplines and focused on the questions that arise in the course of planning for dissemination of an innovation.[124]

Still, the literature as a whole tends to be normative rather than empirical in nature, suggesting how the dissemination function should be organized and conducted rather than how it is in fact carried out, with what degrees of success, in what settings, under what conditions. Some of this needed empirical information is beginning to become available in the form of research and evaluation data from the various experimental dissemination projects that are proliferating under the new federal emphasis on dissemination.[125] But dissemination remains the most diffuse of the existing functional specialties, the hardest to describe in specific operational terms. And the virtual absence of a marketing approach to dissemination of educational innovations, and the rarity of even any mention of marketing concerns,[126] suggests that this function remains the most immature and underdeveloped of those specialties that have emerged to date.

E. Development

The development function has produced some case materials,[127] but relatively little in the way of a synthesis of the accumulating knowledge and technology base of the field. We are aware of only two volumes designed to provide an understanding of the development function in education and we were able to acquire only one of these for review.[128] The volume we reviewed was useful for understanding the nature of educational development (in the struct R&D sense), development policymaking, and development management, but of little help for providing more than the vaguest impression of the nature or state of development of the underlying knowledge and technology base of the field. One gets the impression that such a technology base may in fact exist in the few centers of rigorous development work found in the R/D&I system. But there is little in the literature to give new developers or developers working elsewhere a grounding in the procedures and strategies that distinguish systematic development in the R&D sense from development work as it has always been carried out. In all likelihood, then, we can assume that they will continue inefficiently reinventing the wheel.

F. Other Relatively Absent Functional Specialties

The picture is even less sanguine for the functional specialties that have yet to emerge in education. There is a large literature on the adoption of innovations,[129] and several syntheses of the existing knowledge base on factors that influence the rate of diffusion of innovations.[130] But relatively little of this is geared to the needs of acquisition personnel. There is some research literature on problems encountered in attempting to implement complex educational innovations.[131] But given the rather belated recognition of implementation and utilization problems as critical sources of weakness in educational R/D&I, and the virtual absence of implementation and utilization as specialized functions in education, it is little wonder that there is little of an implementation/utilization knowledge and technology base to synthesize. The new surge of interest in internal school system problem-solving has led to the publication of a few useful introductory guides for school personnel.[132] Some problem-solving and renewal approaches that have developed a following of their own (e.g., Organizational Development) have produced a sizeable literature and some efforts at synthesis.[133] But generally lacking are comprehensive overviews of what we know about implementation and utilization problems in general or with respect to specific kinds of products, programs, or organizational innovations.

G. Summary

In summary, the knowledge and technology base of educational R/D&I functions is so poorly developed that there appears to be at least some grounds for questioning whether creation of an educational R/D&I system may have been premature. Perhaps without such a system the kind of knowledge and technology needed might never have been developed. But regardless of where one stands on that issue, it seems reasonable to assume that wherever the knowledge and technology base of R/D&I activities remains weak, as it is in education, system outputs will be generally poor in quality, low quality outputs will produce or reinforce negative environmental influences that inhibit the flow of ample funds, personnel, and other essential inputs into the R/D&I system, and system maturation will be retarded. Unless there is more focused attention on, and substantial progress in, the development of the knowledge and technology base of the field, the future of the educational R/D&I system may remain clouded.

3. Stability of Structure

Mature R/D&I systems generally manifest substantial stability in macro and micro structures. By the time a system reaches maturity, gaps and inadequacies in the macrostructure have been corrected. Appropriate linkages, interfaces, and coordinating mechanisms have evolved. Organizational forms have adapted to a point of relative equilibrium with environmental and contextual constraints. For the most part, weaker institutions and organizational units have been winnowed out. Consequently, resources can be focused on substantive R/D&I problems and need not be diverted to structural and organizational concerns.

Educational R/D&I, in contrast, has been characterized by a high level of instability in both macro and micro structures. The last decade and a half have witnessed a groping for appropriate organizational forms -- R&D centers, regional and national laboratories, Title III demonstration centers, ERIC clearinghouses, educational information centers, Instructional Materials Centers, Research Coordinating Units, Intermediate Service Agencies, state and interstate dissemination networks, consulting, training, and technical assistance organizations, and in-house operating system units to support implementation and utilization.[134] Still, the existing configuration shows relatively limited and poorly developed linkages and interfaces within and between functions and organizations. Consequently, the overall configuration of institutions and functional specialties, interfaces and linkages continues to evolve, and a considerable proportion of overall R/D&I resources continue to be allocated to organizational design and experimentation with new forms -- with all the attendant problems of uncertainty and learning time to be expected from this kind of experimentation.

To permit us to trace the evolving configuration, and changes in that configuration, it would be useful for us to have such basic information as how many institutions of various types were carrying out how much educational R/D&I activity of what types each year. NIE's KPU Monitoring Program is expected in time to provide this kind of data-gathering for the future. But even without such data in hand, the instability in structure seems clear.

A. Signs of Progress

The pattern, then, has not been one of stability, but progress is clearly evident in two aspects of this institutional or configurational evolution that should be noted:[135]

1. The trend appears to be toward creation of larger-scale institutionalized, linked, programmatic R/D&I, and away from the pattern that existed two decades ago when the field consisted largely of:

   a. scattered researchers (mostly individuals or small teams in academic settings, doing small scale, non-cumulative studies of schools and studies, yet having few strong linkages to operating system personnel);

   b. a small number of large curriculum improvement projects in selected subject areas (again, staffed largely by university scholars);

   c. a considerable amount of internal, in-house, practice-based development of curriculum by school system personnel (rarely disseminated much less evaluated, validated, or packaged for use by others);

   d. private companies providing textbooks, materials and equipment; and

e. a very small number of private sector research organizations.

2. Overall, the trend has been toward substantial expansion and stabilization of the institutional base. Our own observations suggest the following:

a. A substantial number of new R/D&I institutions or organizational units have emerged (precise figures on this await findings from the NIE Education KPU Monitoring Program survey of organizations).

b. There have been a significant number of losses in the institutional base due to lack of funding or markets for services (for instance, the decrease from 30[136] to 17 of the original federally funded regional laboratories and R&D centers).

c. There appears to be a considerable "levelling off" in the "loss rate" among existing educational R/D&I institutions (as seen, for instance, in the strengthened political position of the labs and centers).

d. It appears that a healthier degree of career stability is becoming possible even in the newer of these institutions.

B. Macrostructure Instability

Configurational evolution in education has been complicated by substantial structural instability within the federal agencies that were the primary sponsors of educational R/D&I. The Office of Education underwent two reorganizations in 1965 and 1969. In 1972 the National Institute of Education was created as a wholly new and independent agency, and lead agency responsibility for the educational R/D&I system was transferred to the Institute. NIE evolved a significantly new agenda for R/D&I sponsorship -- new missions, new policies, new funding programs. But in its brief five-year history, the Institute too has had three different Directors and undergone (and continues to undergo) some reorganizations.

Each reorganization -- within OE, from OE to NIE, and within NIE -- was intended to solve some perceived problem in R/D&I functioning. But the frequency of reorganization in and of itself, regardless of the substance of the changes, complicated planning, operations, and coordination on both the macro and the micro levels. The research or R&D emphases to be supported ebbed and flowed. Programs were started and then stopped before they came to fruition. In the initial years of system functioning, OE was unclear about its expectations and failed to communicate clear messages. Critiques of OE functioning during this period stressed the agency's lack of "a coherent R&D strategy," its "inability to set consistent goals for itself" or goals "meaningful to educational researchers," and its failure to enlist the educational research community to any significant degree in the setting of goals or the development of funding programs.[137]

R/D&I institutions fumbled and underwent constant reorganizations of their own, redefining their missions, developing and then dropping programs and developing new ones, as they tried to second-guess federal officials and meet expectations that were often conflicting and frequently changing.[138] Staff turnover was high, and management turnover was even higher.[139] New institutions appeared, and others disappeared after only a brief existence. Several of the R&D centers and regional laboratories created with such fanfare, and even ERIC clearinghouses, lost their funding or went out of existence for one reason or another. A few such institutions that closed their doors appeared anew in changed form -- e.g.: a core of a regional laboratory staff forming or joining a non-profit or profit-oriented corporation, or one ERIC clearinghouse merged into another.[140] Large corporations entered the education industry and then withdrew as the early promise for expansion and profits dissipated.[141]

C. Degree of Stability of Educational R/D&I as Suggestive of the Transitional Stage of Historical Development

Maturation from the introductory to the transitional phase of historical development of R/D&I systems tends to be marked by expansion and integration of a relatively stable structure. Substantial progress has been made under NIE auspices to expand the existing structure in the direction of increasing KP-KU integration, linking functional specialties, and filling in several of the key interface gaps. And certainly the weeding out of the weaker laboratories and centers and the concentration of more resources in the stronger organizations was inevitable and overdue. Still, whatever the degree of progress, some degree of instability continues, especially in macrostructure management. Long-term prospects for the success of individual R/D&I institutions of high quality will be dependent in part on the development of consistent long-range programs and coordinating mechanisms to produce a stable macrostructure. As long as the possibility of future upheavals and reorganizations of the system's macrostructure seems strong, R/D&I personnel and institutions are likely to show some hesitancy in committing themselves to the kinds of long-term programs needed to advance the development of the R/D&I

system and achieve the long-range goal of improving educational practice. If system maturation is to be substantially furthered, it would seem that NIE's stated commitments to programmatic and organizational stability and to long-range planning[142] will need to be backed up with demonstrable evidence that it can exercise its leadership role in a manner that promotes system stability.

4. Resource Base

Mature R/D&I systems are generally characterized by well developed resource bases adequate to the demands of system functioning and appropriate to the quantity and quality of outputs expected by their sponsors. The inadequacies of the educational R/D&I resource base are readily apparent. We consider two resources at length in subsequent chapters -- personnel and funding. Much of the analysis in these chapters underscores the immaturity of educational R/D&I, and suggests that substantial progress in system maturation is unlikely without intervention in the development of these resource bases. To support our historical analysis, we simply summarize here some of the material covered in these lengthier presentations.

A. Personnel

The personnel base of educational R/D&I may be the most critical and most difficult source of weakness retarding system maturation. Precise data on the personnel base await the results of the organizational survey undertaken as part of NIE's Education KPU Monitoring Program.[143] However, based on general estimates and analyses in the literature, several observations seem reasonable at this time:

1. In comparison to the early 1960s, the educational R/D&I personnel base has more than doubled in size

-- from an estimate of around 4,000 in 1964 to around 10,000 in 1974.[144]

2. Still, the personnel base seems inadequate in sheer numbers.[145]

3. Most of the work force is represented by researchers, evaluation researchers, and development personnel.[146]

4. There would appear to be a particularly inadequate number of personnel to carry out linkage roles.

5. Educational researchers and other R/D&I personnel are generally rated as low in productivity (as measured by publications and other system outputs).[147]

6. By training and professional background, educational R/D&I personnel tend to have been trained either in the fields of education or psychology and come out of the psycho-statistical tradition and university work environments or school system positions as teachers or administrators.[148] Although some progress has been made in recruiting personnel from other fields, these other personnel still represent no more than one-fifth of the educational R/D&I personnel base.[149] Given the multi-disciplinary nature of the field, there is clearly a need for a more substantially multi-disciplinary base of recruitment, including such fields as sociology, anthropology, political science, economics, etc.

7. With few if any training programs geared to producing R/D&I specialists, and the few that have been available geared more to the old pattern of academic project

research rather than programmatic development,[150] on-the-job training has been the primary mechanism for producing manpower with appropriate skills and competencies -- an inefficient strategy at best. Some initiatives have been taken to develop training programs more suitable to the needs of educational R/D&I functioning.[151] But as yet, it is too early to detect a significant change in the character of the system's personnel base.

8. The field suffers particularly from the lack of an adequate supply of trained or experienced R/D&I managers, or even an appreciation of R/D&I management as a function that could benefit from specialized skills and training.[152]

The recruitment, training, and socialization of a talented personnel base for educational R/D&I will require overcoming several seemingly intractable problems -- e.g.:

1. the low prestige of education, educational research, and educational R&D;

2. the orientations of most of those who come out of university settings toward advancing theory rather than improving practice, toward individualistic rather than team functioning, toward relatively homogeneous rather than heterogeneous personnel skill mixes, toward producing publications rather than products or programs, and toward a "professional" rather than a "bureaucratic" style of functioning and management;

3. the complexities of developing suitable training programs given the ambiguity that surrounds the definition

of work roles, requisite skills, and standards for various functional specialties in the field, and the weakness of the existing knowledge base; and

4. the instability of R/D&I funding and the insecurity of R/D&I positions compared to tenured university posts.

Unless R/D&I sponsors give concerted attention to these problems, continued system maturation will be difficult to achieve. But is it possible to attract talented personnel to educational R/D&I given the present poor quality of system outputs and the resultant inability to overcome the system's low prestige? Is it reasonable to try to intervene <u>now</u> in the maturation of the system's personnel base? or, is it wiser to concentrate resources on a few key projects where the critical mass of talent already exists and impressive levels of achievement are within reach? Will a few exciting high quality R/D&I outputs do more to attract talented personnel than resource-building strategies focused on recruitment and training programs? We have no answers to offer, but clearly high level debate on these policy options would seem to be in order, leading, one would hope, to long-range planning of inter-related product development and resource-building strategies to speed system maturation.

B. Funding

The funding of educational R/D&I has tended to suffer from five key weaknesses: relatively low levels, insufficient diversification of sources; instability, inadequate concentration, and inadequate attention to funding policy development.

a. Relatively Low Levels of Funding

The best estimate available for the level of funding for educational R/D&I in this country, from all sources (public and private), is somewhere between $605 million and $673 million (depending on what is included or excluded in a given estimate), with $619 million the most likely figure. These data are for Fiscal Year 1975, the most recent year for which such an estimate is available.[153] This figure must be considered in light of annual education expenditures (by all levels of government combined) of approximately $90 billion by the early 1970s.[154] Using these figures, we calculate that the annual expenditure for R/D&I in education represents no more than 0.7% of total education expenditures. The inadequacy of this funding level is underscored by comparison with other sectors -- e.g.: 3.4% to 5% of expenditures by industry are appropriated to R&D; in the health sector the figure is 4.6%; in agriculture, 1.1%; and the Department of Defense appropriation to R&D runs as high as 10% to 14%.[155] Given the immaturity of educational R/D&I compared to these other sectors and the need for expensive capacity-building expenditures, the low level of funding available to support educational R/D&I seems especially problematic...

b. Insufficient Diversification of Sources

Of the approximately $619 million spent each year on educational R/D&I in this country, the best available estimate is that approximately $513 million, or 83% (in Fiscal Year 1975) came from various departments or agencies of the federal government.[156] Clearly, the federal government has become the primary sponsor of educational R/D&I. The remaining

17% are estimated to come from: state funds, \$40 million (\$30-\$60 million); local government funds, \$4 million (\$2-\$10 million); private foundations, \$57 million (\$57-\$65 million); and other private sector sources, possibly \$5 million (\$3-\$25 million, but here estimation is particularly difficult).[157] Greater diversification of sponsorship would seem to be advisable given the political vulnerability of educational R/D&I expenditures in a climate of limited R/D&I system legitimacy and lack of substantial confidence in the system's ability to produce a reasonable return on the taxpayers' investment. Clearly, though, substantial investment in educational R/D&I by the private sector or by state and local governments is unlikely unless imaginative new incentives are provided and bold new initiatives are taken to attract this new sponsorship.

c. Instability of Funding

Instability of funding has been one of the most serious problems confronted by the educational R/D&I system over its brief history. The early promise of ample funding for educational R/D&I was clouded within only a few years. Funding for different types of R/D&I activities has tended to ebb and flow with frequent shifts and fluctuations in federal R/D&I priorities. Federal reliance on annual rather than longer-term funding cycles was a frequent cause of complaint in the early years of the system. Pleas were made for longer-term funding commitments to permit long-range planning of complex multi-year projects,[158] and some modification of funding policies in this direction has been apparent. And, though apparently passed now, the threat of zero-level funding for NIE that would have terminated the agency's existence only a few short years after it was established, has left the educational R/D&I enterprise with a somewhat shaky image. It would seem that greater longer-term stability will be needed to attract the resource base of first-rate personnel and subcontractors needed to permit system maturation.

d. Inadequate Concentration of Funding

The difficulties posed by low overall funding levels are complicated further by allocation patterns that tend to disperse what little money is available over a large number of projects rather than concentrating it sufficiently on a few. The trend has been toward greater and greater concentration of funding, as more and more projects and programs have lost funding and increasing numbers of federally supported R/D&I institutions have gone out of existence. Still, given the limited funding available and the high costs incurred by large-scale educational R/D&I programs, greater concentration would seem essential if effective programs and products are to be produced.

e. Inadequate Attention to Funding Policy Development

A well conceived funding policy for educational R/D&I would be formulated after dire consideration to a host of factors -- for instance, agency mission and goals in relation to those of other sponsors of educational R/D&I; the state of development of the educational R/D&I system and its system-building requirements; the existing degree of balance or imbalance among R/D&I functions as currently funded (as compared to some sense of minimum degrees of balance required for adequate system functioning and development); the need for some degree of stability and continuity; etc.[159] There is relatively little evidence of much attention to these kinds of systemic considerations in the planning or budgeting processes of NIE as the lead agency for educational R/D&I, or of any of the other key sponsors of educational R/D&I.[160] Since at this time funding policy appears to be the primary leverage federal agencies are able to exert on R/D&I functioning, these sorts of issues would seem to warrant considerable attention.

5. Patterns of Functioning

Virtually any aspect of R/D&I functioning in education might be used to illustrate the immaturity of the system. We shall consider here three that have particularly attracted our interest: the amorphousness of standards, ambiguities in defining work roles and requisite skills, and inadequacies in information flow.

A. Amorphousness of Standards

The current period of heightened self-consciousness in educational R/D&I has produced numerous critiques of the conduct and especially the poor quality of outputs of different functional specialties and R/D&I institutions.[161] Several analysts have suggested models for evaluating the methodological adequacy of completed projects.[162] But, on the whole, the impression that seems reinforced by the literature is that standards of quality and performance in educational R/D&I are amorphous, and the kind of consensus on standards evident in mature R/D&I systems is lacking.

Educational research, for instance, has been described as lacking "a definite structure of criticism."[163] Consequently, poor research gets published along with, and competes for attention with, good research. Quality control is inadequate, quality is uneven, and cumulative development of a high quality knowledge base is retarded.

Educational evaluation has been described as held back by a lack of "benchmarks of performance having widespread reference value."[164] Different standards are held by different groups, are rarely made explicit, and are rarely applied consciously in a rigorous manner.

Consensus is greatest in the more traditional kinds of research, where principles of experimental design and statistical treatment can be applied. Yet even here, the literature reflects substantial controversy and intense disagreement.[165]

The diffuseness of standards in educational R/D&I is particularly apparent from descriptions of the standards and criteria that are used, or should be used, by educational R/D&I personnel in conducting and appraising their own work and evaluating the performance and outputs of others. The phrases used to describe these standards and criteria underscore their personal, subjective, "soft" character -- "personal satisfaction or feeling," "acceptance by others (in project)," "acceptance by users," "appropriateness," "relevance," "timeliness," "intelligibility," "fidelity," "credibility," "viability," "pervasiveness," "convenience," "goal attainment," "completeness of content," "utility or value," "logical rigor or consistency," and "clarity of objectives."[166] More often than in mature R/D&I systems or in disciplines with well developed knowledge and technology bases, we find sponsors judging educational proposals in terms of the significance of the problem area rather than quality of conceptualization, or methodological rigor of design, or institutional capability to carry it out.[167]

The literature includes a few pieces that consider the issue of standards for the field -- even one discussion of some kind of certification system.[168] But clearly, maturation of educational R/D&I would seem to require more concerted attention to the problem of standards, either by AERA or some other body. At the very least what is needed is formulation of rigorous, objectively phrased standards for all the various functions, processes, activities, and outputs that comprise educational R/D&I. Beyond that, over the long run, the field needs to develop some reasonable level of consensus on these standards, and explicit, perhaps even self-conscious application of these standards to the conduct of educational R/D&I. Given the generally poor quality of educational research and R/D&I outputs to date, this problem would seem to be particularly pressing.

B. Ambiguities in Defining Work Roles and Requisite Skills

R/D&I operations tend to require team functioning under bureaucratic modes of management. A large proportion of the R/D&I personnel at work in the system today were socialized in settings characterized by individualistic definition and investigation of research problems regulated only by peer approval.[169] Adaptation to the new mode of functioning has been painful for many, impossible for some. There appears to be little in existing training programs to make that adaptation any easier for new recruits to educational R/D&I.

The literature provides evidence that there has been some interest in the field in developing taxonomies or work requirements and needed "enablers" (skills, knowledge, and sensitivities) for given R/D&I tasks.[170] Over time, information of this kind may be useful for the design of effective training programs geared to the demands of R/D&I system functioning. At the moment, however, our impression is that a significant amount of ambiguity surrounds the definition of work roles and relationships and their requisite skills. There is a danger in our overstating the case. Progress has been made in defining the technical aspects of R/D&I functioning and some of the technical skills needed for certain functional specialties. But interview data assembled from case studies of exemplary R/D&I projects are most revealing about an array of other kinds of skills that R/D&I personnel judge critical to the work they do -- skills for which many are ill prepared by training or prior work experience. Work with others in a team setting is one of the most frequently mentioned of these skills. Writing ability is another. Sensitivity to the dynamics of various organizational and inter-organizational settings is still another.[172] While personnel involved in day-to-day R/D&I functioning call attention to these "nontechnical" as well as the usual technical skills associated with their work, the literature on competencies required to carry out R/D&I tasks tends to concentrate on only the technical aspects. If educational R/D&I is to function smoothly, realistic pictures of R/D&I work environments must be provided to new recruits, and training programs (both pre-service and in-house) must be oriented toward socialization and sensitization as well as technical competence.

C. Inadequacies in Information Flow

Inadequate, inefficient information flow is one of the most pervasive problems in educational R/D&I system functioning. We consider information flow problems in some detail in subsequent chapters.[173] The literature is filled with discussions about the lack of adequate dissemination and linkage mechanisms to bring R&D outputs to the attention of operating system personnel, and to facilitate adoption and implementation of externally developed innovations.[174] There are also a number of useful analyses of the barriers to information flow in the operating system -- among educational practitioners as a profession, among school districts, even within school districts and within single school buildings.[175] But perhaps least understood until recently is the inadequacy of information flow among the researchers and R/D&I personnel functioning on the KP end of the KPU spectrum.[176] Though the formal information flow system of professional association meetings, journals, secondary publications, and information agencies parallels other fields and disciplines (in the case of the ERIC system it surpasses many other fields in easy access to the fugitive literature of the field), KP functioning in education generally lack the well developed informal communication networks of mature disciplines and R/D&I systems. There has been increasing interest in such concepts as "research communities" and "invisible colleges."[177] As yet, though, there is relatively little evidence of the emergence of the kind of social organization of research areas so critical to the rapid development of cumulative knowledge bases and maturation of the R/D&I systems dependent on these knowledge bases.

The improvement of information flows may hold one of the most significant keys to facilitating system maturation. Yet, despite AERA interest in this area some years ago[178] we are aware of no significant initiatives to promote the development of research communities and invisible colleges in educational research and R/D&I functions. Some significant developments are under way to increase information flows within the operating system, and also between the external R/D&I and operating systems. This is clearly a major focus of NIE initiatives in dissemination and in developing local problem-solving capabilities. The intent is to increase the level of integration between the R/D&I and operating systems. The potential for the future is promising. But most of these initiatives are too new to have had significant impact on the vast educational system in this country. At the present time, then, the inadequacies of information flows in education appear to be a clear indicator of the immaturity of the R/D&I system.

6. Degree of Integration between the R/D&I and Operating Systems

A mature R/D&I system could be characterized as an integrated "system of reciprocating parts," with components meshing so effectively that developments in one part of the system bring about changes in all other parts of the system.[179] In education, this might mean that a major breakthrough in the research or development function, for instance, would affect not only institutions that conduct research or development activities but also school systems, state departments of education, teachers training institutions, R/D&I sponsors, etc. This is hardly what one finds in fact in education. The linkages in education tend to be casual and incidental, and information flows from one part of the system to another are episodic at best.

One of the most pervasive themes in the educational R/D&I literature is the lack of integration between R&D, on the one hand, and educational practice, on the other. The R&D and operating systems appear to function in two discrete, compartmentalized worlds, barely touching. The literature describes and documents the large gap between educational research and practice.[180] Little educational research has been found to have any discernible impact on educational practice. And virtually none of the predominant practices of school systems have been found to have any foundation in educational research. As described by several analysts, educational research is rarely oriented to problems of educational practice, and therefore, researchers are not accumulating a knowledge base about educational practice and how to improve it. Few of the products of R&D institutions and few of the highly publicized innovative strategies of recent decades have been found to be implemented in school systems; where they have been found, they tended more often than not to be emasculated into "more of the same old thing." School systems that are highly innovative have been described as generally drawing on internal rather than external sources of innovation. New materials and programs are produced by their own professionals, using severely limited local resources, to develop local innovations that are for purely local consumption. Consequently, a vast body of practice-based innovation fails to get disseminated or even documented; little of it is adequately researched or systematically evaluated; relatively few of these innovations are even "developed" sufficiently to permit utilization by educators other than those who created them. Clearly, then, innovation in education, where it does exist, is not being managed with maximal efficiency for the educational enterprise in this country.

The evidence comparing educational research and R&D outputs, on the one hand, to educational practice, on the other, seems overwhelming. Although there has been less commentary on other weak links in R&D and operating system integration, some of these too have been noted. The teacher-training institutions, for instance, tend to pass on conventional practice rather than provide an appreciation, or an up-to-date understanding, of new developments in the R/D&I system.[181] To consider another example, R/D&I and operating system personnel tend to be part of different information flow systems that rarely overlap. They tend to read different journals, belong to different professional associations, attend different kinds of meetings, etc.[182]

We consider the gap between the educational R/D&I and operating systems, and some of the reasons for it, in several chapters of our analysis.[183] Our concern at this point is simply to call attention to this factor as additional support for the conclusion that educational R&D is still in an immature state of development and will require concerted attention to KPU integration to speed maturation processes.

The need for greater KP and KU integration has been given increasing recognition in the past few years. The literature of the '60s included a few calls for increased practitioner participation in educational R&D decision making,[184] some lucid pieces by one major theorist of education R/D&I calling for a market-oriented rather than KP-oriented approach to the institutionalization of educational R/D&I,[185] and a burgeoning literature analyzing the dissemination function and calling for the creation and support of needed linking roles and linking institutions. But only in the past few years have dissemination and linkage become a major focus of federally funded R/D&I organizations. Linkage organizations are proliferating.[186] Support for local problem-solving has emerged as a major new thrust of federal funding and research. Organizational Development and various other organizational renewal strategies appear to be taking the field by storm.[187] Do-it-yourself guides are appearing to help school systems analyze and solve their problems, find and negotiate with external resource organizations, etc.[188] KP organizations are becoming more concerned about implementation and utilization of their products, and leaders of some of the more successful of these organizations are publishing analyses of their approaches and experiences to stimulate others to follow their lead.[189] More resources are being devoted to creating nationwide dissemination networks, using the active, interpersonal, technical assistance and consulting type of strategies that appear to be most effective in creating significant change.[190] Even the ERIC system is undergoing change from a vast, passive storehouse of undigested print to a more active system that is increasingly producing targetted information analysis products, and is increasingly being tied into local education information centers with the capability to produce information products tailored to specific local needs.[191] One large scale program was funded in an effort to document and analyze a number of exemplary local problem-solving projects to capture, and provide development and dissemination of materials derived from, internal user system innovation sources.[192] Other federal initiatives such as the experimental schools program show some movement in the direction of focusing on educational practice in exemplary but real operating systems as the basis of research, development, and the spread of innovation and the improvement of practice.[193]

There are, then, a number of exciting developments afoot to increase the integration between the R/D&I and operating systems. It is too early to see significant impact from these initiatives. In time, though, programs of this kind may prove to have been of major importance in speeding education R/D&I maturation.

7. System Outputs

Mature R/D&I systems produce high quality outputs that are readily marketed and widely used in the relevant operating systems. Educational R/D&I activity has produced a substantial number of outputs. In preparation for 1976 publication of the Catalog of NIE Education Products,[195] information was collected on some 776 of a much larger number of practice-oriented outputs developed with OE or NIE funding over the past decade or so. Clearly, a listing of the total number of outputs produced over the past two decades, by all institutions carrying out educational R/D&I sponsored by all funding sources, would be many times larger. Several other catalogs and reviews of educational products have also appeared in recent years.[196]

At this time, there are few data-based statements that can be made about the overall quality of these outputs. Clearly, though, the tone of most of the discussion of output quality that has appeared in the literature is rather negative.[197] Most of this tends to be impressionistic and based on examination of a relatively small proportion of what has been produced. Still, the repeated theme is that the outputs are generally poor in quality and relatively few can be found in school systems affecting educational practice.

At the same time, the system has always produced some outputs of outstanding quality and widely reputed excellence that have been widely adopted by school systems. In the late '50s and early '60s, the NSF science curriculum improvement projects received a very positive response.[198]

In the late '60s, Individually Prescribed Instruction (IPI) was cited repeatedly, along with Sesame Street, as examples of exemplary projects, diffused on a wide scale, that have produced significant changes in educational practice.[199] In an effort to identify and make better known some of the other high qualtiy outputs of the system, some projects have tried to identify exemplary projects and have brought increased attention to 30 such outputs described in the NIE 1976 Databook.[200] Examples of a few of these products with extensive utilization histories are:

Sullivan Reading Program (programmed readers), reportedly being used by more than five million children.

Science Curriculum Improvement Study (fundamental concepts/ elementary school science), reported to have been used by more than one million students.

The Southwest Regional Laboratory's Kindergarten Program, or First Year Communication Skills Program (basic skills of English language communication), reportedly used by about 250,000 students.

Similar efforts have also identified specific outstanding pieces or programs or bodies of educational research that have been judged to have had a significant effect on educational practice.[201]

There has, then, been some achievement. The picture is perhaps even more encourageing if one takes a broader and longer term view of system outputs. This view stresses the gradual development of the field of educational R/D&I as an important system output in itself. Proponents of this position argue that several important gains can be observed over time in the system's brief history -- acceptance of the idea of rigorous development and continuous data-based refinement in the production of materials and programs;[202] recruitment of needed kinds of personnel,[203] and gradual development of new kinds of training programs appropriate to new functional specialties; development of new technologies appropriate to the practice of these new functional specialties under the environmental and organizational constraints peculiar to the educational context; creation of needed new institutions to fill gaps in the system macrostructure and to provide the kinds of linkage, interface, and coordination required to permit more effective system functioning; and above all, greater understanding of the requirements and complexities of R/D&I functioning in the educational context, an output that required, and continues to require, learning time.

The field, then, has made some noticeable progress in establishing itself and gradually evolving the personnel, and knowledge and technology base needed for longer-term development of the system's capabilities.

IV. THE HISTORICAL FUTURE: WHERE DO WE GO FROM HERE?

We have devoted a considerable amount of space to the historical past and present of the educational R/D&I system. Before turning to the system's future, it would seem useful to summarize some of the key points we have tried to make about historical forces that continue to be felt as significant constraints on policy formation and R/D&I functioning in this sector.

We noted several elements in the historical milieu of the '60s (and to a lesser extent the '50s) that significantly affected how the emerging system came to be perceived, what was expected from it, who would or would not be numbered among its supporters, and some of the kinds of needs the system would attempt to meet. First, the fact that the federally funded educational R/D&I institutions (the labs, centers, etc.,) were created during a reform upswing in the reform-conservatism cycle of recent U.S. social history explains some of the unrealistically high hopes and expectations that its creators had for the system, their impatience with doing much of the slow, undramatic foundation-building needed for future success, and the inevitable disillusionment that followed in the cyclical downswing. The legacy of both the high hopes and the disillusionment continue to be felt, making it all the more difficult after more than a decade to explain how long it may take to get significant breakthroughs in complex areas, or how significant a portion of available resources should be spent on long-term capability building rather than short-term product and program development.

Second, the creation of a federally funded R/D&I system external to the operating system at the same time that educational practitioners were coming under increasing attack as incompetent and uncaring did not help to endear R&D personnel to struggling teachers and administrators. Generally strained relationships between operating personnel and external experts (who tended to have limited familiarity with operating system constraints or perceived needs) were not helped by seeing what appeared to be lavish quarters for federally funded laboratories while principals had to fight for money to replace light bulbs and broken windows. Some of this ill will may still continue today, complicating further the difficult problems of KP-KU integration.

And third, the development of educational R/D&I at the same time that race and poverty were emerging as social and political issues in this country and schools were coming to be viewed as major vehicles for social reform meant inevitably that a major focus of R/D&I activity would be meeting increasingly vocal demands for school programs targetted at specific racial and ethnic groups and at the economically disadvantaged. This continues to some extent today.

Aside from the historical milieu out of which the system emerged, other historical factors have had important effects on system functioning. One such factor is the newness of institutionalized R/D&I in education compared to the centuries of history associated with the operating system, and traditions, norms, and values that run counter to acceptance of the outputs of external R&D. R&D approaches to producing knowledge, products, and programs compete with traditional methods for scarce resources, and in many cases R&D outputs are clearly inferior to conventionally developed products. Consequently, the R/D&I system has a legitimacy problem which makes it more difficult not only to achieve KP-KU integration but also to generate sufficient demand for R&D products to build a strong constituency able to overcome some of the system's political problems.

Perhaps most critical of all, the emergence of the federal government as the sponsor of most educational R/D&I activity has significantly affected not only the level, distribution, and stability of R/D&I funding but also the character of the system that has evolved. Policy options selected, rejected, or ignored by federal officials during the course of that brief history continue to be felt as constraints on policy formation and R/D&I functioning. For instance, emphasis on non-university organizational forms as more conducive to mission-oriented R&D contract work, with relatively little attention to linking university researchers to the work being done in the research corporations or building peer review safeguards into the release of procured research and R&D outputs, has complicated the problems of insuring quality control of research and R&D outputs, developing a cumulative knowledge and technology base for the field, facilitating information flow, attracting high-powered research talent to education, and training new educational research and R&D manpower.

Emphasis on creating (or heavily supporting) new organizational forms, rather than working within existing settings, or building new programs around the existing critical masses of talent in education, has made it more difficult to attract high calibre personnel who have strong ties to the universities and locales in which they are working[204] and at any rate would have little to gain and much to lose by leaving the universities to join a laboratory or research corporation.

Several early OE decisions, made directly or by default, had similar effects and pose similar kinds of continuing problems -- e.g.: the creation of a large number of laboratories and centers rather than a few, the funding of large numbers of programs rather than only a few, and the emphasis on short-range quick pay-off goals. The decision to create a large network of new laboratories and centers, without concern for the inadequacy of the supply of skilled, talented personnel to staff it, virtually predetermined the poor quality of R/D&I functioning in most of these institutions, the low quality of outputs, and a worsening of the prestige, political environment of the system, and its attractiveness to talented researchers. Had the system started on a smaller scale, and concentrated on producing a few impressive achievements, educational R/D&I might have had more success in attracting eminent researchers from the disciplines and talented younger researchers and students as well. The small institutional base could have expanded gradually with the increased supply of trained, R/D&I personnel.

Similarly, little visible achievement was produced by funding large numbers of programs instead of only a few, or by emphasizing the short-term goal of producing packageable products to solve immediate problems rather than focusing on longer-term needs that might produce significant gains but only after considerable time. Educational R/D&I today might be in a somewhat better position if: (1) available funds had been adequately concentrated on a few programs where a critical mass of talent was already available and the knowledge and technology base was sufficiently developed to bring impressive achievement within reach; or if (2) resource allocation had emphasized building the system's capabilities for adequate functioning or planning staged cumulative attacks on the gaps in a knowledge base that need to be filled prior to application in product or program development. The detrimental effects of these various decisions continue to be felt in the low prestige of the system, and its inability to attract large numbers of talented personnel or sufficient support in Congress and among the federal agencies that significantly influence the appropriations process.

The OE strategy of developing a network of new institutions, external to the operating system, has complicated the problems of KP-KU integration. OE policies ignored the operating system's potential for effective KP functioning and underestimated the difficulty of disseminating, marketing, winning user system adoption or producing effective user system implementation of externally developed R&D outputs. Consequently, the limited impact of external R&D on educational practice has increased the political difficulties of the educational R/D&I system in trying to justify its existence, much less the need for additional funding. NIE's emphasis on building a network integrating the newer and older organizational forms, external R&D organizations and internal operating system KP capabilities, and emphasizing dissemination, delivery, and implementation supports as well as KP functions may in time overcome the difficulties posed by the earlier approach. But for the present, they continue to be felt.

In the remainder of this chapter, we examine alternative descriptions of the likely future development of the system, given actions that may or may not be taken, particularly by the sponsors of education R/D&I activity, and especially NIE as the lead agency for educational R&D.

At the very outset of this discussion, it seems important to take note again (as we did at the beginning of this chapter) of our analytical biases, for our analysis rests on certain fundamental assumptions that others may not share.

All of the work that we have done assumes that the various institutions or organizations and the thousands of personnel engaged in one way or another in education R/D&I activity (as sponsors, performers linkers, or users of R/D&I outputs) constitute a "system", albeit at present a weak and loosely linked system. The system notion focuses attention on how elements interact, and therefore how decisions made in relation to one issue or one set of institutions can have significant implications for other issues and other institutions. Therefore, possible courses of action can be considered in terms of their possible repercussions and side effects throughout the system and not simply in terms of the immediate case at hand.

The system notion also directs attention to the concept of maturation. We mentioned this briefly at the beginning of this chapter. R&D systems go through a historical development, proceeding from birth, through a transitional stage, to a gradual maturing of structure and patterns of functioning. Throughout this volume, we suggest various kinds of policy options that we believe should be considered (or at least studied) so as to further the process of "system maturation"; i.e., to further the strengthening of the field's institutional and personnel base, the knowledge and technological foundations on which R/D&I activity is based, the R/D&I processes within each functional area of activity (research, development, etc.), and especially the linkages and information flows across parts of the system. And we argue for NIE to play a strong lead agency role, by adapting policies that will further this system maturation process and by providing the kinds of coordination, orchestration, coalescing, and quality control that mature systems are able to provide on their own.

Given this set of biases, we have come to view the future historical development of the system in terms of the likely impact of NIE (in collaboration with other sponsors and institutions as well) taking either a laissez-faire or an active stance in relation to system maturation. Clearly, this is an oversimplified dichotomy, and in reality there is likely to be something of a continuum of degrees of laissez-faire and degrees of active system leadership, and the precise degree of activism taken is likely to vary with given issues. However, even acknowledging all of that, we think the oversimplified dichotomy will help us to make our key points.

Clearly, any attempt to predict the future is fraught with risks and is foolhardy at best. There are so many unknowns. And if the historical past is any indication of the future, the only certainty to be predicted is the certainty of unexpected shifts in priorities and directions. A new NIE Director, a new President, a new set of financial pressures on Congress producing cutbacks in education and other social services, the creation of a Department of Education - any of these developments could dramatically change the parameters of the situation to make the recent past vastly different from the system's future.

Still, if for no other reason than to provide some understanding of the importance of the "lead agency" posture, and to suggest the significant gains to be expected from NIE taking an active lead agency stance, it seems useful to try to extrapolate the future from our assessment of the recent past and the present. Assuming no significant changes in the generally laissez-faire stance NIE has taken with regard to assuming lead agency roles, what are we likely to see in the next ten to twenty years, and what differences might be expected if a more active leadership stance were taken?

Much of what we predict for the future is positive, regardless of the activism of NIE's leadership - learning time generally produces gains regardless of anything that is or is not done to improve system functioning. The two futures we predict (as outcomes of a laissez-faire stance versus an active system leadership posture by NIE) differ in terms of the magnitudes and types of gains to be expected over the next ten to twenty years. Let us consider, first, what the future is likely to look like assuming no major change in NIE's relatively laissez-faire approach toward system development issues.

1. Educational R/D&I's Future, Assuming a laissez-Faire Orientation Toward System Concerns

A. The System's Environment

With the exception of some low points (such as the NIE appropriation battles in 1974 and 1975), the overall envtronment of educational R/D&I in this country does seem to have improved to at least a moderate degree over the past decade or so. We do not mean to imply that there is a high degree of enthusiasm or even support for the educational R/D&I enterprise. Rather we take note of the fact that the intense animosity that used to characterize relationships between the R&D "system" and key elements in its environment seems to have cooled. The old foes of the system have either passed from the scene in Washington (or from positions that enable them to voice criticisms) or they have lost interest in the subject and gone on to other matters. Educational R/D&I may simply be ignored at this stage of its history, perhaps as too small a kettle of fish to warrant concern.

Given past ill will, this "neutrality" can only be viewed as a plus and, barring unforeseen blowups, this benevolent neutrality (or "benevolent neglect") is likely to continue. Left alone to develop, with less constant review and scrutiny, and less pressure to produce evidence of immediate payoffs, policy is likely to be made in a much healthier climate and on sounder bases than might have been possible in much of the past. And given this neutrality and ignoring of the system, congressional appropriations are likely to continue to show the usual pattern of gradual (albeit very gradual) increases.

Modest gains are also likely in the relationships between the external R&D and operating systems. Some quality products have been produced, are being more effectively disseminated, and are reaching users who are reacting with at least modest enthusiasm. School systems are likely to continue relying more heavily on commercially developed materials and their own internal resources than on either R&D outputs or exemplary practices developed elsewhere. But still, the old hostility seems to be gone. Practitioner interest groups are, if not enthusiastic about the R&D system, at least less antagonistic, and somewhat mollified as they see themselves getting some chunks of the R&D pie that was previously closed off from them. They are still likely to feel that they are not sufficiently consulted on their needs, and that educational R&D is neither adequately responsive to their needs nor adequately cognizant of the constraints under which operating systems function. But overall, the linkages between the R&D and operating systems have been improving (though very gradually), and this seems likely to continue and perhaps even to be strengthened by NIE's new emphasis on the importance of the practice setting.

We see no reason, however, to expect significant improvement in the low prestige and status of education and educational R&D, no developments likely to significantly raise the esteem in which the field is held by the scholarly community or the public at large. This is bound to continue to have a detrimental effect on the system's ability to attract first-rate talent to the field, significantly higher levels of funding, or other forms of needed support.

B. Funding

Funding levels are likely to expand very gradually. And funding decisions are likely to continue to be made on an ad hoc, project-by-project or program-by-program basis, with little if any coordination across agencies (or other sources of sponsorship). There is likely to be a considerable element of arbitrariness in funding policy decisions (such as establishing percentage set asides for funding certain kinds of work, without developing sound rationales for such decisions or considering the host of factors that should be taken into account as a basis for such decisions). For the most part, funding decisions are likely to continue to focus on the need to produce substantive outputs to solve particular problems, without giving much additional consideration to effects of funding decisions on the system's capacities or its environmnet. NIE is likely to continue to conceive its responsibilities largely in terms of funding particular kinds of work rather than also assuming active roles in system orchestration, coordination, etc.

C. Goals

The brief history of the education R/D&I system in this country has been characterized by a continuing dialectic over the appropriate goals for such a system and the kinds of work that therefore should be supported. To what extent should the available resources be allocated between such goals as increasing our understanding versus improving practice? improving the scientific and technological foundations of practice versus providing products? developing new products versus disseminating existing ones? working with educators on the use of innovative materials and the development of self-renewal structures and processes versus working outside the practice setting on generating new knowledge and developing new products for ultimate application in the practice setting?

There have been major shifts in relative emphases over the past two decades in the rhetoric and the available funding levels to support research, demonstrations and evaluation research, development, dissemination and utilization, and now a renewed emphasis on the importance of fundamental research and on improving educational practice. Given past history, it seems reasonable to expect a regrouping of forces and a new fight to ensue shortly, to reverse what is being perceived as a deemphasis on R&D and especially development work. As they feel the pinch of reduced development funding, the non-profit organizations and the universities (who conduct most of the federally funded development work) may team up to revive the debate over what is needed most and what the system should be trying to achieve.

D. System Capacity: The Institutional and Personnel Base for R/D&I Functioning

System capacities can be discussed in quantitative or in qualitative terms. Taking a look at the quantitative issues first, the evidence seems clear that capacity for R/D&I activity has expanded enormously over the past two decades. However, a substantial amount of this growth is attributable to direct federal investment in capacity building, and the signs seem to be that substantially less attention is being directed toward capacity building questions now than in the '60s. We would therefore expect that without a significant change in policy direction, the future will likely show more modest rates of expansion, with growth rates varying across functional areas and types of institutional performers.

For instance, though NIE's share of the overall educational R/D&I budget is small and its policies do not as yet appear to have had a major influence on the funding policies of other educational R/D&I sponsors, recent funding policy shifts by NIE can be expected to have at least a modest effect on overall system capacities. On the basis of NIE policy emphases, we would expect over the next few years to fund at least a modest expansion of LEA innovation capacities and a more significant expansion in the capacities of SEAs and ISAs (Intermediate Service Agencies), especially in the areas of dissemination and utilization. Associated with these changes (and others that were already under way, especially at the state level) we would expect to find significant increases in capacities for need identification and also for dissemination and utilization. We would expect too to find modest improvements in the establishment of the key linkages needed to make these new capacities productive in affecting practice on the LEA level.

However, we would also expect to find some loss of capacity over the next few years in R/D&I specialties receiving decreased support. This seems especially true in the case of large scale development work which is losing some NIE support. Whether this will lead to similar shrinkage in support for development work from other sponsors (or to their increasing support for development work to take up the slack) remains to be seen. But it seems likely that we can expect to see some shrinkage in development capacity in the non-profit organizations and academic institutions that have been carrying out the bulk of this work.

Whether this will lead these institutions to reorient themselves toward growing areas of funding (e.g., fundamental research) can not be predicted now. But one thing does seem certain. Regardless of what these institutions do to reshape some of their overall effort to stay alive in the grants and contracts economy, development capacity and fundamental research capacity are not interchangeable. It is not reasonable to try to shift development specialties into fundamental research which may be expanding for a time. The length of time required to train competent fundamental researchers is enormous, and there seems strong reason to believe that fundamental research and development activity call for entirely different kinds of people, who function differently, approach problems differently, and respond differently to different kinds of constraints and ambiguities in the work environment. In short, if development capacity is lost, it is likely to be lost permanently and not simply shifted temporarily to other assignments until development funds flow again.

The shrinkage in development funding is likely to hit the non-profit corporations and academic institutions with particular severity. The labs and centers are likely to stay afloat with little difficulty as long as they can maintain their political clout and budget set-aside. But approximately 30% to 40% of educational R/D&I funding for non-profit corporations (as a whole category) and universities is for development work,[204] and to make up for a significant reduction in these funds they are likely to try to compete more intensely with the for-profit corporations for evaluation funding and possibly move more heavily into applied research, policy research, and perhaps utilization activities. Or, even more likely, they will reorient some of their effort away from education and into other social service fields. Thus capacity might be lost altogether from the field of education.

Although it has been widely assumed that increased funding for fundamental research would strengthen the universities, where most basic research is carried out, it is not entirely clear that this will be the case unless sponsors other than NIE also increase their support for fundamental research. The reason for this is that while most agencies do heavily support academic institutions for the conduct of basic research projects, NIE gives most of its basic research funds (73% in FY 1975[205]) to non-profit organizations.

Even if some marginal increase of funding is channelled to the universities, it seems most likely that the increased funding will be scattered in a way that is not likely to promote the growth of "centers" of research excellence or the cumulative development of bodies of significant research. This is suggested, for instance, by the recent NCER resolution: (a) increasing the funding allocated to fundamental research but mandating that at least 50% of the basic research funds be awarded to single researchers or small groups of investigators (rather than the kinds of research teams we associate with strong research centers); and (b) suggesting (at least by implication) that the unsolicited proposal mechanism would be used to some significant degree to fund this kind of research.[206] It is, of course, too soon to say whether this is in fact what will happen, and it is possible that the review process will work to channel the funding into a few strong lines of inquiry developing a cumulative knowledge base. Still, given past history, what seems more likely is a pattern of scattered funding along the lines of the kinds of project selection decisions made under the Cooperative Research Program in the late '50s and early '60s.

One particularly positive aspect of the strengthening of field-initiated work and the use of the unsolicited proposal mechanism should be a reestablishment of peer review panels, which should in turn strenghten the communication mechanisms of the fundamental research community, improve information flows, and possibly bring into play the operation of 'invisible colleges' and all the strengths they bring to a research community.

We have up to this point focused primarily on quantitative changes in system capacity. It is more difficult to arrive at assessments of the <u>quality</u> of system capacities. Still, most observers of the field would probably agree that quality has not expanded to anywhere near the degree that quantity has. In fact, in some areas at least such as overall research quality there may have been a decline. As funding expanded at rates faster than what could be used by the relatively small base of quality performers, many researchers were attracted to the field whose level of competence was not up to par with the top researchers who had previously dominated the award of research grants when funding was more limited. And when large amounts were provided for new specialties such as development or disseminations, where little existed in the way of strong capacity, those who filled the vacuum had to learn how to do their jobs while trying to do them. The quality of much of the work produced refelected the need for learning time, for the cumulative development of a knowledge/technology base for these specialties, etc.

If the focus, then is on system capacity defined as "capacity" only if it is available for use at a high level of competence, it may be that the level of system capacity has increased only modestly over the past decade or two, and is likely to continue growing at much the same modest rate unless more active capacity building postures are assumed by NIE or by some other center of system leadership (e.g., AERA if it were willing and able to assume such a role, but we have seen relatively little evidence that it is).

The point can be made more strongly by examining the likely impact over the next decade or so of federal initiatives that have been taken with a view toward expanding system capacity but have not been planned in a way that takes into account the complex factors involved in effective system building.

One good illustration is the NCER resolution mentioned earlier mandating increased funding for fundamental research through a percentage of NIE's budget set aside for this purpose. The difficulty with this approach is that money is not the only ingredient required to expand capacity. Especially in an area like fundamental research, where the training of fundamental researchers is a lengthy process that can be carried out well only in existing centers of research excellence, the size of the existing base of quality institutions limits the rate at which quality work in the field can be expanded. Since there is good reason to believe that the amount of increased money may be greater than what the quality base of the field can immediately use productively, the increased money is likely to attract some researchers and institutions functioning at lower levels of quality than what is desired. The funds may, of course, attract first-rate fundamental research talent from fields other than education, and this may benefit the educational R/D&I system by expanding the quality base of fundamental researchers available to it. However, given the low prestige of education, it is unlikely that there would be a heavy influx of first rate talent into education just because of the probably temporary availability of funding. More likely, most of the talented researchers attracted to the money would have primary commitments to other disciplines and would be using the educational context only temporarily to examine questions of interest to them. The overall gain in quality capacity, then, might be only temporary.

Dissemination and utilization are other areas where we would predict that efforts to quickly expand capacity will not have as great an effect as expected because the requirements for quality expansion are not being adequately taken into account. In the case of dissemination, it appears that the institutional base for dissemination activity is expanding faster than the personnel base of dissemination specialists. Consequently, many of the new dissemination programs are likely to be staffed by personnel with virtually no training or specialized expertise relevant to their dissemination roles. Consequently, whatever expertise they develop will be gained over time, largely by seat-of-the-pants on-the-job learning. And while the dissemination specialty can be carried out competently with considerably less training than, let us say, fundamental research, still, there is a body of useful knowledge and skills, strategies and techniques that should be absorbed for effective functioning in dissemination roles.

Much the same can be said in the area of implementation/utilization. There is far less institutional expansion going on here than in dissemination, but whatever expansion is taking place (e.g., in various technical assistance and change agent programs) is probably occurring at a faster rate than what would seem reasonable given the small personnel base with competence in these specialties.

Federal funding has been used to support the development of a number of new training programs for these specialties. But as yet, there is no institutional structure to put these materials into use. One might assume that the universities would respond to the need and provide training for these new specialties. However, as yet we have seen little evidence of this. The universities continue to think of their training programs largely in terms of only teachers, administrators, counselors, curriculum specialists, and researchers. We know of few academic programs that exist to train personnel for future roles as developers, dissemination specialists, change agents or implementation support personnel. Therefore, we would predict that the personnel base will remain out of synchronization with the institutional structure and linkages being created, and the newly created positions will be filled by personnel lacking (at least for a time) in any specialized expertise or skills to perform these new roles on a high level of competence. The consequence is likely to be a continuation of the pattern of poor quality functioning and poor quality outputs.

E. Knowledge/Technology Base, Communication Mechanisms, and Information Flows

There has been some notable progress in strengthening the knowledge and technology base of the field over the past decade or so, and we are clearly in a stronger position now to carry out R/D&I activities than we were ten or fifteen years ago. In research, progress is evident in the cumulative development of knowledge in certain research areas where existing knowledge has been synthesized and critiqued in various research articles, annual reviews and handbooks. Though considerably more progress is needed, evaluation and needs assessment methodologies have grown by giant leaps over the last decade. The underlying knowledge/technology bases for carrying out development, dissemination, implementation/utilization support and change agent approaches are still in their infnacy, but here too we seem to be light years ahead of where we were a decade ago.

Some progress has been made in the professionalization of some of these specialties and in development of more effective communication mechanisms and information flows. The evaluation specialty has probably shown the greatest progress here. We would assume that this progress would continue, and that the rate of gain would even pick up somewhat given the stronger foundation that already exists. However, we ~~would~~ anticipate a much more significant rate of gain if more direct policies were implemented to: strengthen the scientific and technological foundations of the field; identify the areas of work that warrant priority attention; allocate resources in a way that significantly builds capacity and assures cumulative development of work in these areas; and develop more effective communication mechanisms and information flows within and across R/D&I specialties. We shall have more to say about these kinds of policies later in this discussion.

F. Outputs

Without more active system leadership, we would expect to see only modest improvement in the quality of outputs produced by the system over the next couple of decades. We would assume that LEAs will continue to develop many of their own programs and products, much as they have in the past. Though we would expect to find some progress in the work on identifying, validating, and packaging exemplary programs, we assume that only a relatively small portion of all the LEA producers and all the LEA users will be touched by those efforts and that most LEA-produced development work will remain "invisible" and inaccessible to the rest of the field.

At the same time, we would expect to find some improvement in the quality of the outputs produced by systematic R&D - a consequence of learning time and of the evolution of a stronger knowledge/technology base and a stronger institutional and personnel base than was available a decade or two ago. However, there is likely to be somewhat less of this large-scale development work in the coming years if the NIE deemphasis of development projects is continued and especially if other educational R/D&I sponsors adopt similar policies.

Without more concerted attention to dissemination and especially implementation/utilization issues, we would anticipate some but only moderate improvement in the dissemination of these R&D outputs to school districts, and only modest increases in utilization figures. We are beginning to see federal policymakers taking cognizance of the significance of the implementation and utilization functions. If this is followed by strong policy initiatives, more focused attention on this part of the innovation process might produce desired increases in school system capacities to use innovations, in willingness to experiment with new outputs, and ultimately, in adoption and utilization rates. But as yet, we have not seen any significant enough changes in policy direction to feel confident that this will happen.

G. System Capacity to Assess Its Own Functioning and Improve Its Operations and Outputs

This is probably the most significant single area of difference in the futures we would predict for the system from the perspective of laissez-faires postures vs. active system leadership. As currently operating under an essentially laissez-faire posture toward system issues, the educational R/D&I enterprise in this country has relatively little data on its own operations, a miniscule (and underutilized) capacity to monitor and study itself, and relatively little that could count as a strong analytical capacity to assess system operations, identify needed areas of improvement, and formulate appropriate policy initiatives for the consideration of system policymakers. There is almost no R&D or innovation management specialty in education, and few if any training programs geared to meeting the need for R&D managers or policy analysts. Lacking even (outside of a relatively small circle) is aceptance of the kind of system perspective that would seem to be required before any of these needed steps might be undertaken.

Consequently, in the last two decades the educational R/D&I field has learned relatively little about itself or how to improve its functioning toward more mature patterns. The field seems even to lack the kind of "institutional memory" that might overcome the tendency to repeat past mistakes, or to debate the same issues over and over again every few years without even an appreciable gain in the level on which the debate is conducted. Unless there is some reversal of this head-in-the-sand approach to system management, we see little reason to expect more than a rather modest future gain in the system's ability to assess its own needs and develop sound policies to meet those needs and thereby overcome some of the inadequacies of system functioning.

2. Educational R/D&I's Future, Assuming Active System Leadership

At several points in the chapters which follow, we point out the need for more active system leadership to guide the educational R/D&I system toward greater maturity. Much of what we have to say focuses on policies we believe should be pursued by NIE, for we take NIE's role as the lead agency for educational R&D as the starting point of much of the policy thinking we have done. If NIE were to take a more active leadership stance, alone or with the collaboration of AERA or some other body such as the Federal Council on Educational Research and Development, what kinds of policies would we expect to see implemented and what impact might they be expected to have on the future of educational R/D&I in this country?

A. System Leadership

If NIE were to commit itself to active system leadership and to devote substantial resources and first-rate talent to its system-oriented responsibilities, we would expect the Institute's management and staff to become especially prominent in exerting intellectual leadership for the field as a whole, bringing together key people in all segments of the field to collaborate with the Institute in developing consensus on goals, weaknesses, and direction of needed work. We would expect forceful, persuasive positions to be taken, supported by plentiful evidence produced by a strong data base and monitoring system, espoused before all the key segments of the system and its environment. And in time (perhaps five to ten years), we would expect this to raise the esteem in which the field is held and promote tempered, reasonable, realistic optimism about what the field might be able to achieve given sufficient resources, time, planning, and skill. We would expect, too, that this optimism would be realistically related to substantive progress in capacity building, strengthening of knowledge and technology bases, information flows, etc.

B. Agency-Field Relationships

A strong leadership stance of this kind would seem to require the development of close, collaborative relationships between NIE and the field. Before this could be possible, considerable change would have to occur in the climate of opinion in Congress and in Washington policy circles as to the propriety of such close relationships between agency staff and potential contractors. A different perspective would seem to be needed on "conflict of interest" issues -- one that takes into account the difference between mature R/D&I systems that have numerous strong contractors (making open competition a reasonable approach to procurement) and immature systems which have relatively few strong centers of excellence (where, therefore, sole source procurement strategies or limited competitions may be considerably more cost-effective). And, too, considerable change would seem to be needed in NIE staffing, such that agency personnel would be oriented toward collaborative field relationships, have the skills and expertise to make such relationships possible, and perhaps, too, the kinds of credentials that would enable them to establish close working relationships with the leading scholars or professionals in an area and facilitate the development of "invisible colleges" and/or other communication networks and structures able to speed the maturation of new research areas, etc.

C. Non-procurement Activities

If NIE is to work in close collaboration with the leadership of the field to facilitate information flows, speed the accumulation of relevant knowledge and technology bases, stimulate activities to increase the amount of knowledge synthesis and utilization, etc., we would expect to see a significant share of NIE's resources devoted to leadership activities that do not involve procurement -- e.g., holding conferences; attending meetings of professional associations and possibly making presentations, holding symposia, leading discussion groups, and meeting informally with people from the field; meeting across the country with various members of key groups in the field; drafting (or commissioning the drafting of) issues papers for distributions to members of these various networks for their reactions and comments; working with other federal agencies and non-federal sponsors of educational R/D&I activities as well, provide a degree of coordination and orchestration to the whoel educational R/D&I enterprise; etc.

D. Procurement Planning

If NIE were to accept an active system leadership posture and especially accept system capacity building responsibilities, we would expect to see much greater investment of resources in pre-procurement planning than is currently evident. For instance, we would expect to find NIE staff working closely with leading figures in the research community to identify: (a) research areas where the accumulated knowledge and technology base is already strong enough to provide a sound base for R/D&I activity; (b) research areas that have a strong base of knowledge and technology with significant potential application but are still in need of certain kinds of work to resolve unanswered questions that remain as obstacles to effective R/D&I application programs; and (c) other areas of basic research that may still be in their infancy but should be supported because they seem potentially important for fundamentally affecting the ways we think about certain educational issues in the future.

We would expect, too, to see the agency planning its procurements in ways that: (a) capitalize on the possibilities of achieving more than one purpose at a time (e.g., doing substantive work to solve a problem while also building needed system capacities and possibly, too, improving the system's environment); (b) take into account the ways in which the various contracts awarded to an institution can shape that institution andhow the various awards and contracts made at any time by all the various R/D&I sponsors impact and shape the system as a whole; (c) take into account the activities of all R/D&I sponsors and try to achieve a degree of coordination and synergy; and (d) relate procurements to the considerable amount of non-procurement activity an agency can undertake to strengthen system functioning.

In addition, we would expect to see procurement planning by a lead agency making use of budget planning strategies that take into account the need for balanced growth across functional areas, maintaining existing capacities, and expanding capacities in each functional area at a rate determined by the state of development of the existing capacities in that area, the rate at which those capacities can be expanded without loss of quality, and formulas that take into account existing and projected budget levels and cost factors for each kind of functional activity and for degree of impact on capacity in each functional area per dollar invested in different kinds of capacity building strategies.

Such formulas do not exist at this time, but we have suggested in our funding dhapter the kinds of analytical and empirical work that might produce such formulas some time in the future. For instance, we have suggested that agency budget planners should be thinking about capacity building in terms of the following summary questions: (a) How long is it likely to take, and how much is it likely to cost, to expand the base of quality institutions adn personnel in each functional area to various specified levels of strength? What alternative strategies are likely to have what effects, at what costs? (b) Given the existing quality base in each functional area and in each major priority problem area, and estimates of the rate at which the quality base can be expanded thorugh various alternative strategies, at what rate can the funding level be expanded productively in each area? (c) Given variations across functional areas in in herent cost, requirements, in the amount of capacity building required, in the inherent cost and time requirements of capacity building, and in the rate at which capacity in each can be expanded while still maintaining a high level of quality given the existing institutional and personnel base in educational R/D&I), what allocation of funding across functional areas would seem to be suggested as needed for a healthy R/D&I system expanding at a reasonable rate toward greater maturity and high levels of quality?

Ultimately, we have suggested that agency procurement planning should be able to make use (either implicitly or explicitly and concretely) of a multidimensional grid type of project selection and budget planning instrument that would focus NIE attention on three factors: (a) substantive foci of projects and programs (as these relate to agency missions and priority problem areas); (b) system capacity building/capacity maintenance requirements; and (c) the existing pattern of funding of the above across all the sponsors of educational R/D&I activity.

Balance across diverse requirements might be assessed in terms of how well a range of different needs were shown to be met by different grid patterns produced by different allocation decisions taken or proposed. Imbalances might be readily pinpointed through such an instrument, as well as allocation shifts needed to bring funding back into greater balance across areas.

E. Data Base and Monitoring System Requirements

Before mechanisms of this kind could be developed, NIE (and other educational R/D&I sponsors) would require a strong data base from an ongoing monitoring system on existing organizational, personnel, and system cpapcities. At the very least, such a data base would suggest: what specific R/D&I capacities exist, where, at what levels of development: who can best carry out what kinds of educational R/D&I activity; what minimal funding would be required to maintain existing levels of specific kinds of capacities; what areas of capacity need to be strengthened or expanded; what centers of excellence offer the best potential for extensive capacity building activities; what increases in funding levels could be absorbed productively each year for expansion of capacity in given centers of excellence; etc.

If NIE were functioning in an active system leadership stance, we would expect to find this kind of data-gathering and analytical and planning unit tied closely to the NIE Director's Office, with program development clearly impacted by the analyses carried out by this top level unit.

F. <u>R/D&I System Studies</u>

If such an analytical unit was functioning in a manner with significant consequences for system policy and deciion making, we would expect to see its operations linked to the development of a strong field of R&D system studies and guided by one or more advisory councils comprised of the "invisible college" leadership of that field. We would expect to find the top leadership of the field bringing to bear their experience and insight on the meaning and policy implications of the data gathered, and suggesting directions for new data gathering and analytical work to form a sound basis for future capacity building initiatives.

We would also expect to see this collaborative relationship between the leadership of the field and this agency analytical unit producing various kinds of initiatives to strengthen the knowledge and technology base of the field and its various specialist communities, as suggested below.

G. Development of the Knowledge and Technology Base and the Field's Specialist Communities

If NIE were to assume a strong, active system leadership posture, we would expect to see a sizeable investment of resources in developing the knowledge and technology base of the field. For instance, we would expect to find NIE taking initiatives to stimulate: (a) support for process analyses to document how work in each specialty is carried out -- what tasks and activities are carried out, by whom, where, using what knowledge, skills, and sensitivies, affected how, by what sorts of constraints, etc; (b) the appearance of handbooks, review journals, and other syntheses of the existing knowledge and technology base in each functional area, especial- in areas where such work has been minimal or non-existent (e.g., development, dissemination, and implementation/utilization); and (c) the establishment of professional "communities" in each functional specialty (e.g., dissemination specialists, technical assistance specialists, etc.), "invisible college" mechanisms within each community, specialized newsletters, journals, and other information flow channels within and across those communities; etc.

As a consequence, we would expect to see considerable progress in each functional area, as outlined below.

H. Maturing of Educational R/D&I Functions

Given all of what we have suggested up to this point, we would expect over time to see the following sorts of initiatives for strengthening each functional area, all of which are discussed more fully in the chapters that comprise the remainder of this volume:

a. Fundamental Research

- The attraction of a large number of first-rate fundamental researchers from relevant disciplines to an on-going commitment to research on education-relevant research questions:

- The attraction of a sizeable and stable core of basic researchers within the derivative disciplines (educational psychology educational sociology, etc.);

- The development of consensus within the field on the basic research areas with the greatest potential promise, including identification of those areas that can already support application work; those with promise of being able to do this some time in the future after a number of unanswered questions are resolved; and those areas in their infancy that may be of fundamental significance in thefuture; and

- The identification of centers of excellence for support through substantive project funding and capacity building activities.

b. Applied Research

- The expansion of the large scale applied research mode;

- The identification of centers of excellence for conduct of applied work, for support through project funding and capacity building activities; and

- The development of consensus on the areas of applied work that can be built on a sound basis of existing fundamental research and available technologies, with funding focused largely on these areas.

c. Development

- Strengthening of the systematic R&D mode through: strengthening two-way linkages between specialized development organizations and linkers; reorienting systematic R&D toward developing products just to the point where they can be adapted in any number of ways by school systems (rather than developing them through repeated cycles until they conform to prespecified performance outcomes); and typing some systematic R&D to practice-based development work in a "mixed mode" of innovation origin in the practice setting with packaging by specialized development organizations external to the practice setting;

- Strengthening practice-based development work through increased linkage among practice-based development sites and between these sites and specialized development organization, expecially for packaging practice-based "idea" innovations;

- Strengthening the mixed mode of development work through strengthening the linkages among practice settings, validating bodies, and packaging capacity in specialized development organizations; and

- Strengthening teh knowledge and technology base of the field through focused attention on process analyses of development work in the different modes.

d. Dissemination

- Strengthening existing networks and capacities and creating needed linkages where they do not currently exist;

- Strengthening the resource base for dissemination through increased networking and linkage of existing resource bases;

- Establishing alternative channels and facilitating the development of alternative dissemination strategies to permit redundancy in the system and establish a "fail safe" quality;

- Increasing coordination among networks and channels to increase the efficiency of dissemination operations without necessarily eliminating a useful level of system "fail safe" redundancy; and

- Strengthening the knowledge and technology base of the field through process analyses documenting different dissemination strategies.

e. Implemenation and Utilization

- Creating additional implementation/utilization capacity both within operating systems and in specialized linkage organizations associated with groupsings of school districts;

- Establishing more effective linkages among operating systems, dissemination specialists and resources, and KP organizations; and

- Strengthening the knowledge and technology base of implementation and utilization through process analyses and more practice-oriented and practice-based research.

f. Evaluation and Policy Research

- Increasing the impact of evaluation research and policy studies by providing information in forms that are most useful to decision makers and placing evaluation and policy researchers in units strategically linked to decision makers; and

- Strengthening the methodological base of the field through focused attention to methodological issues and developing some consensus on existing areas of disagreement.

I. The Future of the System's Institutional Base

If NIE were to assume a strong leadership stance, we would expect to see a considerable strengthening of the institutional base of the field, most notably through more selective procurement strategies. We would expect, for instance, that the system's ongoing monitoring system would provide system decision makers with information about which organizations have the strongest capacities for each kind of R/D&I activity; that this information would be used as a basis for procurement decisions: that this information would also be used as a basis for future capacity-building, with an extensive amount of active agency seeking-out and wooing of potential contractors with strong capacities through sole source procurements; and that the system's data base would be provising information about such issues as cost-effectiveness of various institutional types for specific kinds of R/D&I work..

We would expect, too, to see a considerable investment of resources in strengthening the linkages among institutions and subsystems, so that system functioning and information flows would be more productive both within and among the three subsystems we identified (i.e., academic institutions, other private and quasi-public sector institutions, and operating system institutions).

As for specific institutional types, we might anticipate the following kinds of progress:

a. Academic Institutions

- Greater linkage among education schools (departments, or colleges) with university departments and research centers;

- Greater linkage between research (and R/D&I) activity and training for R/D&I specialties through apprenticeship programs, research assistantships, etc.; and

- More active academic roles in practice-oriented research and process analyses of R/D&I activities in different functional areas and in different institutional settings.

b. Private Sector and Quasi-Public Sector Institutions

- More active roles for publishing, media houses, and other organizations in the commercial sector, especially in the packaging of practice-based development work;

- More active roles for regional laboratoreis in dissemination and linkage activities;

- Continued expansion of the strong non-profit and for-profit research corporations that function at high levels of competence, with some weeding out of the firms that have been producing mediocre work; and

- Strengthening of strong R&D centers identified as centers of excellence for applied research work.

c. Operating System Institutions

- Expansion of R/D&I capacities in SEAs, LEAs, and especially ISAs;

- Increased linkage to systematic R&D and packaging capacity to permit the packaging and dissemination of locally developed innovations for use elsewhere;

- Increased attention to self-renewal and local problem-solving strategies and capacities;

- Increased linkage to available KP resources and linkage agents; and

- More active SEA roles in assuming educational leadership roles vis-a-vis the school districts under their jurisdiction.

J. <u>Personnel Base</u>

If these various initiatives to strengthen and expand the field's institutional base were to be effective, considerable attention would hve to be directed at development of the field's personnel base. This would require policies oriented toward:

- projecting personnel requirements for planned initiatives;

- investing substantial resources in process analyses, surveys, and other strategies for determining personnel competencies required for effective functioning in each needed R/D&I activity;

- developing various pre-service and in-service training programs to provide personnel with these needed capacities;

- providing incentives for academic institutions, professional associations, training organizations, consortia of R/D&I performers and/or operating systems, etc. to recruit the needed numbers of personnel and provide the required training programs;

- providing the necessary career incentives and professional supports to attract and maintain the expanding personnel base; and

- monitoring these operations sufficiently to insure the expansion of the institutional and personnel bases of the field are well synchronized and in balance.

K. Outputs

Over the long run, as a result of all these initiatives (including the improved system linkages between KP and KU institutions and processes), we would expect to find an improvement in the quality of research and R&D outputs, and probably an increase in the quantity of usable and used outputs. And with a well developed monitoring system able to measure and assess the production and utilization of outputs, we would expect information about quality and utilization to be available and visible, for use in policy development and in direct and indirect strategies for improving the system's environment.

L. The System's Environment

As a consequence of all these initiatives, we would expect to see the educational R/D&I system's environment substantially improved. Not only would we expect Congress and the general public to have more positive views about educational R/D&I and the venefits accruing from its support, but also we would expect to see educational R/D&I received more enthusiastically by the practice community and regarded more positively by the nation's scientific establishment, both researchers working in areas potentially relevant to education and the scientific community more broadly. Once educational R/D&I thereby overcomes its low prestige, it is likely to have less difficulty in attracting first-rate talent and other resources needed to further enhance system functioning and ultimately facilitate educational improvement.

3. Conclusions

This visionary exercise has taken us off, no doubt, into wild flights of fancy, and we clearly recognize this as such. The sorts of policy initiatives we are proposing are extremely complex and difficult, and the obstacles to their ever seeing the light of day are considerable, involving much more than simple the leadership stance of NIE.

Still, we think this may have been useful -- both to anticipate for the reader some of the policy options we consider in the remainder of this volume and to suggest to the reader the importance of bearing in mind throughout the remainder of the volume such questions as: the proper stance to be taken by NIE (or other potential centers of system leadership), and how much intervention may or may not be possible, with what likely or unlikely effects on the maturation of educational R/D&I functioning.

We turn now in the remaining chapters to consideration of each of the key R/D&I features suggested by our analytical scheme, their current state of development, and possible future needs in the field of education.

FOOTNOTES

1. For instance, see John K. Hemphill, "Management and Operation of Educational Laboratories," Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970. Reprinted in The Oregon Studies in Research, Development, Diffusion and Evaluation, Vol. II: The Literature of Educational RDD&E Bette C. Porter, ed. (Monmonth, Oregon: Teaching Research, Oregon State System of Higher Education 1972). Also reprinted in John K. Hemphill and Fred S. Rosenan eds., Educational Development: A New Discipline for Self-Renewal. (Eugene, Oregon: Center for the Advanced Study of Educational Administration, 1973).

2. For an elaboration of our analytical framework, see: Michael Radnor, Harriet Spivak, and Durward Hofler, Research, Development and Innovation: Contextual Analysis (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

3. For instance: Office of Education, Research and Development Centers Program: Application Instructions, OE 2105-5 (Washington: OC, Cooperative Research Branch, undated, probable date 1964); Office of Education, Guidelines for a National Program of Educational Laboratories, Public Law 89-10, Title IV (Washington: OE, Bureau of Research, Divison of Lsboratories and Research Development, OE-2240c, undated, probable date 1965); Office of Education, Proposed Plan for Review and Evaluation of Research and Development Centers (Washington: Divison of Educational Laboratories, Bureau of Research, Office of Education, March 28, 1968); Ward S. Mason, Letter to Francis S. Chase to provide requested assistance for Chase's OE-sponsored study of the R&D Centers, March 23, 1967; Ward S. Mason, Positions and Prospects of the Research and Development Center Program (Washington: Office of Education, 1968); Office of Education, A Brief Chronology of the Research and Development Center Program (Washington: OE, Division of Educational Laboratories, September 21, 1970); Office of Education, A Brief Chronoloby of the National Program of Educational Laboratories (Washington: OE, Division of Educational Laboratories, September 21, 1970); Office of Education, Brief Chronology of Program of Laboratories and Centers from Mid-1970 to Early 1972 (Washington: OE, Division of Research and Development Resources, March 1972); Special Study of Educational Research, August 1967, conducted by OE Bureau of Research for the Bureau of the Budget, as described in OE, Educational Research and Development in the United States, op. cit. pp. 157-158; DHEW Review of Planning and Programs of the Bureau of Research, conducted by Office of the Assistant Secretary for Planning

and Evaluation; as described in ibid., pp. 158-160; Study of the Bureau of Research Programs by the USOE Office of Program Planning and Evaluation, October 1968, as described in ibid., pp. 162-164; Francis S. Chase, The National Program of Educational Laboratories: Report of a Study of Twenty Educaitonal Laboratories and Nine University Research and Development Centers (Washington: Office of Education, Bureau of Research, December 1968); Stephen K. Bailey, "A Final Report from the Natoinal Advisory Committee on Educational Laboratories," Educational Researcher (Newsletter), Vol. 21, September 1970, pp. 14-15; J. Victor Baldridge and Rudolph Johnson, The Impact of Educational R&D Centers and Laboratories: An Analysis of Effective Organizational Strategies (Stanford, Calif., Natonal Academy of Education; Chicago: Spencer Foundation, 1972) ERIC ED 079 860; Burkart Holzner, with Jiri Nehnevajsa and Leslie Salmon-Cox, The Impact of the Federal R&D Center Program on American Education (Pittsburgh: University of Pittsburgh, 1974); also see the full issue Journal of Research and Development in Education Vol. 1, No. 4, Summer 1968, entitled USOE-Funded Research and Development Centers: An Assessment, especially the following articles in this issue: Francis S. Chase, "Educational R&D: Promise or Mirage?" pp. 3-14, and Norman J. Boyan and Ward S. Mason, "Perspectives on Educational R&D Centers," pp. 190-202, and additional pieces by Brownell and Benjamin S. Bloom; also see the full issue of the Journal of Research and Development in Education, Vol. 2, No. 4, Summer 1969, entitled The Public Interest vis-a-vis Educational R&D, especially the following articles: "Stephen K. Bailey, "Significance of the Federal Investment in Educational R&D;" Norman J. Boyan, "Political Realities of Educatonal R&D;" and Francis S. Chase, "The R&D Institutional Base: What More is Needed?"; also see the full issue of the Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970, entitled Regional Educational Laboratories: Agents of Change, especially the following articles: Stephen K. Bailey, "Emergence of the Laboratory Program;" and Francis S. Chase, "The Laboratories: 1970 and Beyond." Additional useful material can be found in the following articles: In the Educational Researcher (Newsletter), Vol. 22, February 1971, under the section title "USOE's RD&D Operation - A Status Report," see Frank Schmidtlein, The Regional Laboratories - 1970;" Frank Schmidtlein, "The R&D Centers - 1970;" Lee G. Burchinal, "Program of the National Center for Educational Communication;" Glen G. Boerrigter and Albert C. Crambert, "NCERD Unsolicited Basic Research Program: First Year Review." Also see Monte Penney and Howard F. Hjelm, "The Targetted Research and Development Program on Reading," American Educational Research Journal, Vol. 7, No. 3, May 1970; Frank A. Schmidtlein, "The Programs of the Fifteen Regional Educational Laboratories," Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970;

Judith S. Silverman, "FY 71 Program for USOE's Research Center," Educational Researcher (Newsletter), Vol. 21, December 1970; Gary Hanna, "1971 Appropriations -- Low Priority or Capricious Behavior?" Educational Researcher (Newsletter), Vol. 21, September 1970; "Perspectives: NCERD's Silberman," Educational Researcher (Newsletter), Vol. 22, May 1971; See Also the various articles by James Welch in the Educational Researcher (Newsletter) under the column title "D.C. Perspectives," particularly those in the following issues: Vol. 21, January 1970, March, 1970, May 1970, September 1970, December 1970; Vol. 22, January 1971, February 1971, and September - October 1971; also see Welch's articles, especially "Four Regional Laboratories Cut from Federal Programs," Educational Researcher (Newsletter), Vol. 22, January 1971 ("D.C. Perspectives" above); Educational Legislation," Educational Researcher, Vol. 1, No. 1, January 1972; "Funds for Research: A Complex of Issues," Educational Researcher, Vol. 1, No.4, April 1972; "NIE: Lining up the Loaders," Educational Researcher Vol. 1, No. 10, October 1972; "NIE: Glennan's Confirmation," Educational Researcher, Vol. 1, No. 11, November 1972; "Labs and Centers" Cold Winters from Washington," Educational Researcher Vol. 2, No.12, December 1972; "The NIE Budget: A Few Riders," Educational Researcher, Vol. 2, No. 4, April 1973; "Haggerty: A Business Approach," Educational Researcher, Vol. 2, No. 5, May 1973. Also see: Patricia Stivers, "NIE: Learning About Congress the Hard Way," Educational Researcher, Vol. 2, No. 11, November 1973; Patricia Stivers, "NIE: Another Appropriations Crisis," Educational Researcher, Vol. 3, No. 10, November 1974; David R. Krathwohl, "Some Questions and Answers Concerning the National Institute of Education," Educational Researcher (Newsletter), Vol. 21, September 1970; James J. Galifher, "A National Institute of Education: Promise and Problems," Educational Researcher, (Newsletter), Vol. 21, September 1970; Robert M. Gagne, "From the President: Some Thoughts on NIE," Educational Researcher, Vol. 1, No. 12, December 1972 and the various other monthly editorials in the Educational Researcher, especially those by Richard Deisuner in 1972 and by Richard E. Schutz in 1973; also such news summaries as: "NIE Launches a Field Research Program," Educational Researcher, Vol. 2, No. 2, February 1973; "Thorndike Testifies on NIE FY '75 Budget," Educational Researcher, Vol. 3, No. 8, September 1974; "NIE Announced $5 Million in Grants," Educational Researcher, Vol. 3, No. 8, September 1974. Also see: Thomas K. Glennan, Jr., "NIE: A Personal View," Educational Researcher, Vol. 2, No. 3, March 1973; Thomas K. Glennan, Jr., "Whither the National Institute of Education? An Interview," Phi Delta Kappan, Vol. 54, No. 6. Also see: U.S. Congress, House of Representatives, Committee on Education and Labor, Educational Research: Prospects and Priorities (Washington: Government Printing Office, 1972); U.S. Congress, House of Representatives, Committee on Education and Labor, Purpose and Process: Readings in Educational Research and Development (Washington: Government

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4. For instance, see: Lee Cronbach and Patrick Suppes, eds., Research for Tomorrow's Schools (New York: Macmillan, 1969); Office of Education; Educational Research and Development in the United States (Washington: Government Printing Office, 1969); National Institute of Education, The Status of Education Research and Development in the United States: 1976 Databook (Washington: NIE, 1976); David L. Clark, Federal Policy in Educational Research (Bloomington: Indiana University Research Foundation, 1974); David L. Clark, "Federal Policy in Educational Research and Development," Educational Researcher, Vol. 5, No. 1, January 1976; and G.J. Clifford, "Research, Educational: History," in The Encyclopedia of Education, L.C. Deighton, ed. (New York: Macmillan and Free Press, 1971), Vol. 7, pp. 519-526.

5. Richard A. Derchimer, The Federal Government and Educational R&D (Lexington, Mass.: Lexington Books, 1976).

6. For instance, see the figures on "USOE Support by Special Characteristics of Target Group," "Special Characteristics of Target Group, Fiscal Year 1968," "USOE Support by Demographic Area of Intended Impact," and "Demographic Area of Intended Impact, Fiscal Year 1968," in Office of Education, Educational Research and Development in the United States, op. cit., pp. 132-134.

7. Office of Education, Educational Research and Development in the United States, op. cit. pp. 44-46, 113-117.

8. Ibid.; Dershimer, The Federal Government and Educational R&D, op.cit.; and NIE, 1976 Databook, op.cit.

9. OE, Educational Research and Development in the United States op.cit.

10. For instance, see: Paul F. Lazarsfeld and Sam D. Sieber, Organizing Educational Research: An Exploration (Englewood Cliffs: Prentice-Hall, 1964); Sam Sieber and Paul Lazarsfeld, The Organization of Educational Research in the United States, 1966, ERIC ED 010 276; Chase, The National Program of Educational Laboratories, op.cit.; Chase, "Educational R&D: Promise or Mirage?" op.cit.; Bloom article in Journal of Research and Development in Education, Vol. 1, No. 4, Summer 1968, op.cit. Boyan and Mason, "Perspectives on Educational R&D Census," op.cit.; Bailey, "The Emergence of the Laboratory Program," op.cit.; Chase, "The Laboratories: 1970 and Beyond," op.cit; OE, Educational Research and Development in the United States, op.cit.; and especially Dershimer, The Federal Government and Educational R&D, op.cit.

11. Lazarsfeld and Sieber, Organizing Educational Research, op.cit.

12. For instance, see: Chase, "Educational R&D: Promise or Mirage?" op.cit.; OE, Educational Research and Development in the United States, op.cit., p. 75; Dershimer, The Federal Government and Educational R&D, op.cit.; and Bailey, "The Emergence of the Laboratory Program,: op.cit. (See Bailey's discussion of rumors that the Cremin Committee believed there was inadequate talent in the country at the time to support the establishment of more tan 4 to 7 laboratories).

13. See especially Chase, "Educational R&D" Promise or Mirage?" op.cit.; "The Emergence of the Laboratory Program," op.cit.; Boyan and Mason, "Perspectives on Educational R&D Centers," op.cit.; and OE, Educational Research and Development in the United States, op.cit.

14. Several kinds of organizations have come to be referred to as "centers" in the "labs and centers" usage, but various documents differ as to whether or not all of these types of centers are included in the enumerating how many "centers" there are or have been at any one point in time. In addition to the original centers created between 1964 and 1966, the number of organizations now generally included under the "center" rubric includes two vocational education research centers, two educational policy research centers, the network of centers referred to as the National Laboratory on Early Childhood Education, and a center for the development and management information systems for higher education. The picture is further complicated by the fact that one of rhe original R&D centers, the Center for Urban Education, because a regional educational laboratory when the laboratory program began. For the best summary description of this, see NIE, 1976 Databook, op.cit., pp. 39-43.

15. For a good summary of the legislation, see NIE, 1976 Databook, op.cit., pp. 16-20.

16. See the full volume of the Journal of Research and Development in Education, Vol. 1, No. 4, Summer 1968, USOE-Funded Research and Development Centers: An Assessment, especially the articles by Chase ("Educational R&D: Promise or Mirage," op.cit.), Boyan and Mason ("Perspectives on Educational R&D Centers," op.cit.), and Bloom.

17. Chase, "Educational R&D: Promise or Mirage?" op.cit.; Bloom in Journal of Research and Development in Education, Vol. 1, No. 4, Summer 1968, op.cit.; Boyan and Mason, "Perspectives on Educational R&D Centers," op.cit.; OE, Educational Research and Development in the United States, op.cit., pp.75-77; NIE, 1976 Databook, op.cit., pp. 40-43.

18. Bailey, "The Emergence of the Laboratory Program," op.cit.; Chase, The National Program of Educational Laboratories, op.cit.; OE, Educational Research and Development in the United States, op.cit., pp. 39-41; and Dershimer, The Federal Government and Educational R&D, op.cit.

19. For some discussions of this and the rationale for the shift, see: Francis S. Chase, "The R&D Institutional Base: What More is Needed?" Journal of Research and Development in Education, Vol. 2, No. 4, Summer 1969; Bailey, "The Emergence of the Laboratory Program," op.cit.; Chase, "The Laboratories: 1970 and Beyond," op.cit.; Schmidtlein, "The Programs of the Fifteen Regional Educational Laboratories," op.cit.; NIE, 1976 Databook, op.cit., p. 39; and Dershimer, The Federal Government and Educational R&D, op.cit.

20. For instance, this is suggested in Chase, The National Program of Educational Laboratories, op.cit.; Francis S. Chase, "R&D in the Remodeling of Education," Phi Delta Kappan, February 1970, Reprinted in The Oregon Studies, Vol. II, op.cit.; and Francis S. Chase, "Educational Research and Development in the Sixties: The Mixed Report Card," in The Oregon Studies, Vol. II, op.cit.; James W. Becker, "Incorporating the Products of Educational Development into Practice," Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970 (This piece was also reprinted in The Oregon Studies, Vol.II, op. cit. and in Hemphill and Rosenan, Educational Development: A New Discipline for Self-Renewal, op. cit.)

21. For instance, see: Egon G. Guba, "The Place of Educational Research in Educational Change," in The Oregon Studies, Vol. II, op.cit.

22. Ibid.

23. Conversation with Ward S. Mason, April 1974.

24. For instance, see: Chase, The National Program of Educational Laboratories, op. cit.; Chase, "R&D in the Remodeling of Education," op. cit.; Becker, "Incorporating the Products of Educational Development into Practice," op. cit.

25. Ibid.

26. Chase, "R&D in the Remodeling of Education," op. cit.; Chase, The National Program of Educational Laboratories, op. cit.

27. On the "regional blanketing" concept, and the current debate about the need to possibly restore such a "regional blanketing," see Dutward Hofler, Michael Radnor, and Harriet Spivak; Regionalism in Educational R/D&I: A Policy Analysis for the National Institute of Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

28. Whether the precise number of labs and centers is 17 or some other number depends on which types of centers one does or does not include under the "labs and centers" rubric. See our discussion above in footnote #14. Officially NIE counts 17 organizations as "labs and centers."

29. For instance, see "Clearinghouse Merger Follows Rands Report on ERIC Network," Educational Researcher, Vol. 1, No. 4, April 1972; and Carolyn R. Davis, "CICE: A Question of Cost?" Educational Researcher, Vol. 3, No. 4, April 1974.

30. See our subsequent chapter on the institutional configuration of the educational R/D&I system.

31. For instance, see our chapters on the dissemination function and on information flows in the educational R/D&I and operating systems.

32. This argument is made particularly well in Egon G. Guba and David L. Clark, The Configurational Perspective: A Challenge to the Systems View of Educational Knowledge Production and Utilization (Bloomington: School of Education, University of Indiana, 1974). See also Egon G. Guba and David L. Clark, "The Configurational Perspective: A New View of Educational Knowledge Production and Utilization," Educational Researcher, Vol. 4, No. 4, April 1975.

33. John Brademas, "A Congressional View of Educational R&D and NIE," Educational Researcher, Vol. 3, No. 3, March 1974; Claiborn Pell, "Building Partnerships of Educational Research and Development," Educational Researcher, Vol. 4, No. 1, January 1975; David Krathwohl, "Improving Educational Research and Development," Educational Researcher, Vol. 6, No. 4, April 1977; and David L. Clark, "Federal Policy in Edu-

cational Research and Development," Educational Researcher, Vol. 5, No. 1, January 1976.

34. Ibid.

35. For instance, see data on this in NIE, Building Capacity for Renewal and Reform, op. cit.

36. See our Outputs chapter.

37. Bailey, "The Emergence of the Laboratory Program," op. cit.

38. Dershimer, The Federal Government and Educational R&D, op. cit.

39. For more on this argument, see Hendrik D. Gideonse, "Research and Development in Education: A Market Model," in The Orgeon Studies in Educational Research, Development, Diffusion, and Evaluation. Vol. III: Conceptual Frameworks for Viewing Educational RDD&E, H. Del Schalock and G. Roger Sell, eds. (Monmouth, Oregon: Teaching Research Division, Oregon State System of Higher Education, 1972).

40. Ibid.; also see NIE, Building Capacity for Renewal and Reform, op. cit.

41. OE, Educational Research and Development in the United States, op. cit.; Dershimer, The Federal Government and Educational R&D, op. cit.

42. For instance, see Dershimer, The Federal Government and Educational R&D, op. cit.

43. For some discussion of this, see Daniel P. Moynihan, Maximum Feasible Misunderstanding: Community Action in the War on Poverty (New York: The Free Press, 1969).

44. See espcially, NIE, Building Capacity for Renewal and Reform, op.cit.; NIE, A concept Paper for the School Practice and Service Division, op. cit.; Glennan, "NIE: A Personal View," op. cit.; NIE, Dissemination and Resources Group Program Plan, FY 1978, op. cit.; NIE, FY 1976 Program Budget, op. cit.; NIE, Preliminary Program Plans, FY 1978. Executive Summary, op. cit; NIE, School Capacity for Problem Solving Group, Program Plan, May 1975 (Washington: NIE, 1975); and NIE, Office of Dissemination and Resources, R&D System Support Program (Washington: NIE, April 12, 1974).

45. For instance, see Gallagher, "A National Institute of Education: Promise and Problems," op. cit.; and Dershimer, The Federal Government and Educational R&D, op. cit.

46. For instance, see Krathwohl, "Some Questions and Answers Concerning the National Institute of Education," op. cit.; Gallagher, "A National Institute of Education: Promise and Problems," op. cit.; and Gagne, "From the President: Some Thoughts on NIE."

47. See especially the reported interview with Daniel P. Moynihan in James Welsh, "D.C. Perspectives," Educational Researcher, Vol. 21, September 1970.

48. Welch, "Funds for Research: A Complex of Issues," op. cit.

49. James S. Coleman was the only eminent researcher among the 15 appointees to the Council, and his appointment was for only one year.

50. This seems strongly suggested in Richard E. Schutz, "The Politicalization of American R&D in Education: A Program Report," Educational Researcher, Vol. 2, No. 12, December 1973; and Brademas, "A Congressional View of Educational R&D and NIE," op. cit.

51. Welch, "Funds for Research: A Complex of Issues," op. cit.

52. Brademas, "A Congressional View of Educational R&D and NIE," op. cit.

53. Stivers, "NIE: Learning About Congress the Hard Way," op. cit.

54. Stivers, "NIE: Another Appropriations Crisis," op. cit.

55. Dershimer, The Federal Government and Educational R&D, op. cit.; Stivers "NIE: Learning About Congress the Hard Way," op. cit.; Gallagher, "A National Institute of Education: Promise and Problems," op. cit.; and Krathwohl, "Some Questions and Answers Concerning the National Institute of Education," op. cit.

56. See especially, Stivers, "NIE: Learning About Congress the Hard way," op. cit.; Brademas, "A Congressional View of Educational R&D and NIE," op. cit.; and David L. Clark, "Federal Policy in Educational Research and Development," Educational Researcher, Vol. 5, No. 1, January 1976.

57. Stivers, "NIE: Learning About Congress the Hard Way," op. cit.

58. Schutz, "The Politicalization of American R&D in Education," op. cit.

59. For the most recent report on the activities carried out by the AERA Governmental and Professional Liaison Program, see David H. Florio, "Educational Research and the 95th Congress: AERA Governmental and Professional Liaison Report," Educational Researcher, Vol. 7, No. 11, December 1978.

60. For one significant example of this and the dire consequences it had for NIE's appropriations stuggle with Congress, see Stivers, "NIE: Learning About Congress the Hard Way," op. cit.

61. For instance, see the following NIE documents, Building Capacity for Renewal and Reform, op. cit.; A Concept Paper for the School Practice and Service Division, op. cit; FY 1976 Program Budget, op. cit.; Fiscal Year 1977: Program Plans. Executive Summary, op. cit.; Dissemination

and Resources Group Program Plan, FY 1978, op. cit.; Program for Monitoring the Education KPU System: Current and Planned Activities, op. cit.; and RFPs for contracts to establish what was originally called the "Dissemination and Feedforward System: (later renamed the "R&D Exchange Program"), to evaluate the State Capacity Building Program in Dissemination, to conduct studies in the utilization of R&D in education, and to conduct a survey of insitutions which carry out educational R/D&I activities.

62. For instance, see Glennan, "NIE: A Personal View," op. cit.

63. In FY 1975, research and problem-solving (materials development, policy formulation demonstrations, and evaluation research accounted for approximately 91% of NIE obligations. Research and materials development alone accounted for approximately 40% of NIE obligations. See Appendix 3 table in Ward S. Mason, Carnot E. Nelson, and William M. Sowers, Federal Funding for Education Knowledge Production and Utilization: KPU Function, By Agency (Washington: National Institute of Education, Dissemination and Reosources Group, R&D System Support Division, 1977).

64. On the federal educational R&D budget and its distribution across agencies and functions, see our chapter on funding of educational R/D&I. Also, for the increasing federal emphasis on the dissemination and utilization functions in education, see our chapter on dissemination.

65. NIE, FY 1976 Program Budget, op. cit.

66. National Institute of Education, Preliminary Program Plans, FY 1978. Executive Summary (Washington: NIE, July 1976).

67. Ibid.

68. Center for New Schools and Center of Educational Policy and Management, DTA Project Overview 1977 (Chicago: Center for New Schools, 1977), p. 4.

69. Ibid., p. 6.

70. One of the authors of this analysis participated in the December 1977 NIE review panel which recommended a substantial reduction in funding for the program and a phase-out of most of its planned activities.

71. For more about "research-on-research," see our subsequent chapter in this volume, "Research on the Educational R/D&I System."

72. NIE, FY 1976 Program Budget, op. cit.

73. NIE, Building Capacity for Renewal and Reform, op. cit.

74. NIE, A Concept Paper for the School Practice and Service Division, op. cit.

75. NIE, Preliminary Program Plans, FY 78. Executive Summary, op. cit.

76. For instance, see NIE, School Capacity for Problem Solving Group, Program Plan. May 1975, op. cit.

77. Ibid.

78. Glennan, "NIE: A Personal View," op. cit.

79. Ibid.; and Levien, Preliminary Plan for the Proposed Institute, op. cit.

80. NIE, Preliminary Program Plans, FY 1978. Executive Summary, op. cit., pp. 1-2, 4-5.

81. NIE, R&D System Support Program, op. cit.

82. Dershimer, The Federal Government and Educational R&D, op. cit.

83. Gallagher, "A National Institute of Education: Promise and Problems," op. cit.; Welsh, "D. C. Perspectives," Educational Researcher (Newsletter), September 1970, op. cit.

84. Patricia Stivers, "Researchers at NIE: From Planning into Action," Educational Researcher, Vol. 3, No. 5, May 1974.

85. Michael Radnor, Draft materials on Historical Development as a comparative feature across R/D&I Systems (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, April 1975).

86. Michael Radnor, Durward Hofler, and Harriet Spivak, Draft materials prepared for NCER 1977 Report to Congress (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, December 14, 1976).

87. See our subsequent chapter on the development function in educational R/D&I.

88. For discussions of this linked R&D notion; see: OE, Educational Research and Development in the United States, op. cit., p. 6; Chase, The National Program of Educational Laboratories, op. cit.; and Boyan and Mason, "Perspectives on Educational R&D Centers," op. cit.

89. For an analysis of some of the assumptions underlying this attack, see Harriet Spivak, School Decentralization and Community Control: Policy in Search of a Research Agenda (New York: Center for Urban Education, 1974).

90. See our subsequent chapters on the development and dissemination functions in educational R/D&I.

91. Lee J. Cronbach and Patrick Suppes, ed., Research for Tomorrow's Schools: A Disciplined Inquiry for Education (New York: Macmillan, 1969).

92. David L. Clark and John E. Hopkins; A Report on Educational Research, Development, and Diffusion Manpower, 1964-1974 (Bloomington: Indiana University Research Foundation, 1969); Sieber and Lazarsfeld, The Organization of Educational Research in the United States, op. cit., Robert Bargar, Egon Guba and Corahann Okorodudu Development of a National Register of Education Researchers (Columbus: Ohio State University Research Foundation, 1965); Guy T. Buswell, T. R. McConnell, Ann M. Heiss, and Dorothy M. Knoel, Training for Educational Research (Berkeley: Center for the Study of Higher Education, University of California, 1966); Danel E. Griffiths, Research in Educational Administration: An Appraisal and a Plan (New York: Bureau of Publications Teachers College, Columbia University, 1959); Nicholas A. Fattu, "The Role of Research in Education - Present and Future," Review of Educational Research, Vol. 30, No. 5, December 1960; Guba, "The Place of Educational Research in Educational Changes," op. cit.; OE, Educational Research and Development in the United States, op. cit.

93. AERA membership alonegrew in little more than a decade from around 3,000 to 13,000 members.

94. The most important of these structural changes are the establishment of large-scale research centers or R&D organizations, both on and off university campuses, employing large teams of full-time research or R&D personnel. Included here are the regional laboratories and R&D centers also multi-disciplinary research centers as a more established organizational form, and large thriving private sector non-profit research organizations, and large numbers of smaller for-profit research organizations that survive largely on government contracts.

95. For instance, see Marshall Arlin, "One-study Publishing Typifies Educational Inquiry," Educational Researcher, Vol. 6, No. 9, October 1977.

96. For a broad discussion of some of these points see Ronald Corwin, Beyond Bureaucracy in Educational Research Management. Paper presented at the Mid-Year Meeting of the Special Interest Group on Research Management, American Educational Research Association, November 1973. Reprinted in The Generator (Newsletter, AERA Division G), Vol. 5, No. 2, Winter 1975.

97. The evaluation research function has expanded so rapidly that it became a separate AERA division a few years ago and now, with around 4,000 members is one of AERA's largest divisions.

98. For instance, see NIE, Building Capacity for Renewal and Reform, op. cit. and Ilene N. Bernstein and Howard E. Freeman, Academic and Entrepreneurial Research: The Consequences of Diversity in Federal Evaluation Studies

99. For a broad sampling of reprinted articles, see especially the evaluation section in The Oregon Studies, Vol. II, op. cit. and Carol H. Weiss, Evaluating Action Programs: Readings in Social Action and Education (Boston: Allyn and Bacon, 1972). See especially our chapter on Evaluation Research and the sources cited in that chapter.

100. For instance, see Glennan's statement about there being "no modal development cycle" in Glennan, "NIE: A Personal View," op. cit.

101. For instance, see: Harold Home II, "Education Research - The Promise and the Problem," Educational Researcher, Vol. 5, No. 6, June 1976; Chase, "Educational R&D: Promise or Mirage?" op. cit.; Chase, The National Program of Educational Laboratories, op. cit.

102. For instance, see the AERA colloquium reported in: Richard Dershimer, ed., The Educational Community: Its Communication and Social Structure (Washington: American Educational Research Association, 1970), ERIC ED 057 275. See especially the colloquium recapitulation by Dershimer and the piece by Ronald G. Corwin and Maynard Seider entitled "Patterns of Educational Research: Reflections on Some General Issues." Also see: Home, "Education Research - The Promise and the Problem," op. cit. and see comments made by Bidwell and Storer, quoted in Dershimer, The Federal Government and Educational R&D, op. cit., p. 24.

103. Benjamin S. Bloom, "Twenty-five Years of Educational Research," American Educational Research Journal, 1966, No. 3; Chase, "Educational R&D: Promise or Mirage?" op. cit; N. L. Gage, "Paradigms for Research on Teaching," in Handbook of Research on Teaching, N. L. Gage, ed. (Chicago: Rand McNally, 1963).

104. Norman W. Storer, "The Organization and Differentiation of the Scientific Community: Basic Disciplines, Applied Research, and Conjunctive Domains," in Dershimer, ed., The Educational Research Community: Its Communication and Social Structure, op. cit.

105. C. W. Sherwin and R. S. Isenson, First Interim Report on Project Hindsight, June 30, 1966, No. AD 642-400, Clearinghouse for Federal Scientific and Technical Information, Springfield, Va.; C. W. Sherwin and R. S. Isenson, "Project Hindsight," Science, 156 (1967), pp. 1576-1577.

106. R. L. Ebel, ed., Encyclopedia of Educational Research, Fourth Edition (New York: Macmillan, 1969).

107. Gage, Handbook of Research on Teaching, op. cit.; and Robert M. W. Travers, ed., Second Handbook of Research on Teaching (Chicago: Rand McNally, 1973).

108. This quarterly had an important change in publication policy in 1969. Until then, all articles were solicited by the editors and covered a specific relatively unvarying set of subjects tied to educational practice; with the full list of subjects repeated again in cyclical fashion every few years. Thus, one issue in each cycle would be devoted to reviewing what had been happening in curriculum; another issue, evaluation research;

etc. In 1969, the journal was transformed to focus on research areas rather than practice areas, with all articles unsolicited and no prespecified set of areas to be reviewed. With the change, the Review became an extremely useful journal for the educational research community.

109. All volumes of the annual Review of Research in Education have been published by F. E. Peacock, located in Itasca, Illinois. Vol. 1, 1973, was edited by Fred N. Kerlinger. Vol. 2, 1974, was edited by Fred N. Kerlinger and John B. Carroll. Vol. 3, 1975, was edited by Fred N. Kerlinger. Subsequent volumes have been edited by Lee S. Shulman.

110. D. T. Campbell and J. C. Stanley, "Experimental and Quasi-Experimental Designs for Research on Teaching," in Gage, ed., Handbook of Research on Teaching, op. cit.

111. The best synthesis of the knowledge base of the dissemination function is Ronald G. Havelock, A. Guskin, M. Frohman, M. Havelock, M. Hill, and J. Huber, Planning for Innovation through Dissemination and Utilization of Knowledge (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1969). For some of the key syntheses of the knowledge/technology base of the evaluation research function, see our chapter on this function and especially the sources cited below in footnotes 118-120.

112. See especially John K. Hemphill, "The Relationships Between Research and Evaluation Studies," in The Oregon Studies, Vol. II, op. cit; John K. Hemphill, "Educational Research, Educational Development, and Evaluation Studies," in Hemphill and Rosenan, Educational Development: A New Discipline, op. cit.

113. For instance, see: Egon G. Guba, "Development, Diffusion and Evaluation," in Knowledge Production and Utilization in Educational Administration, T. Eidell and J. Kitchel, eds. (Eugene: Center for the Advanced Study of Educational Administration, 1967), also reprinted in The Oregon Studies, Vol. II, op. cit.; Daniel L. Stufflebeam, "Evaluation as Enlightenment for Decision-Making," in The Oregon Studies, Vol II, op. cit.; Robert E. Stake, "The Countenance of Educational Evaluation," Teachers College Record, Vol. 68, No. 7, April 1967, reprinted in The Oregon Studies, Vol. II, op. cit.; and in Carol H. Weiss, ed., Evaluating Action Programs: Readings in Social Action and Education (Boston: Allyn and Bacon, 1972).

114. See especially: Michael Scriven, "The Methodology of Evaluation," in Perspectives of Curriculum Evaluation, R. W. Tyler, R. M. Gagné, and M. Scriven, eds., AERA Monograph Series on Curriculum Evaluation (Chicago: Rand McNally, 1967), reprinted in The Oregon Studies, Vol. II, op. cit. and in Weiss, Evaluating Action Programs, op. cit.; Stake, "The Countenance of Educational Evaluation," op. cit.; Sutfflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.; Donald T. Campbell, "Reforms as Experiments," American Psychologist, Vol. 24, No. 4, April 1969, reprinted in Weiss, Evaluating Action Programs, op. cit.; Robert S. Weiss and Martin Rein, "The Evaluation of Broad-Aim Programs: Dif-

ficulties in Experimental Designs and an Alternative," reprinted in Weiss, Evaluating Action Programs, op. cit.

115. For instance: Weiss, Evaluating Action Programs, op. cit.; The Oregon Studies, Vol. II, op. cit., Chapter II; Francis G. Caro, ed., Readings in Evaluation Research (New York: Russell Sage Foundation, 1971); and the annual review published each year by Sage Publications of Beverly Hills, Evaluation Studies: Review Annual, Vol. 1, 1976, Gene V. Glass, ed.; Vol. 2, 1977, Marcia Guttentag, ed.; Vol. 3, 1978, Thomas D. Cook, ed.

116. Scriven, "The Methodology of Evaluation," op. cit.

117. Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.

118. For instance, see the articles on evaluation models in Scarvia B. Anderson, Samuel Ball, Richard T. Murphy, et. al., Encyclopedia of Educational Evaluation: Concepts and Techniques for Evaluating Education and Training Programs (San Francisco: Jossey Bass, 1974); also the articles on evaluation models in Gary D. Borich, ed., Evaluating Educational Programs and Products (Englewood Cliffs: Educational Technology Publications, 1974). Also see: Stake, "The Countenance of Educational Evaluation," op. cit.; Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.; and the following other pieces from The Oregon Studies, Vol. II, op. cit.: Robert S. Randall, "An Operational Application of the CIPP Model for Evaluation;" Peter Crane and Clark C. Abt, "A Model for Curriculum Evaluation;" William C. Theimer, Jr., "A Model for Post Hoc Evaluation;" John B. Peper, "Summary of Program Relevance Evaluation Model;" and Esther Kresh, "An Overview of the Discrepancy Evaluation Model and a Related Case Study." Also see: Gene V. Glass, "Educational Product Evaluation: A Prototype Format," Educational Researcher, Vol. 1, No. 1, January 1972; Marcia Guttentag, "Subjectivity and Its Use in Evaluation Research," Evaluation, Vol. 1, No. 2, 1973; Daniel L. Stufflebeam, Walter J. Foley, William J. Gephart, Egon G.Guba, Robert L. Hammond, Howard O. Uherriman and Malcolm Provus (PDK Commission on Evaluation), Educational Evaluation and Decision Making (Itasca, Illinois: F. E. Peacock, 1971); W. James Popham and Dale Carlson, "Deep Dark Deficits of the Adversary Evaluation Model," Educational Researcher, Vol. 6, No. 6, June 1977; David Hamilton, David Jenkins, Christine King, Barry MacDonald, and Malcolm Parlett, Beyond the Numbers Game: A Reader in Educational Evaluation (London: Macmillan Education Ltd., 1977); and M. Provus, Discrepancy Evaluation for Educational Program Improvement and Assessment (Berkeley: McCutchan Publishing, 1971).

119. For instance, see Robert Stake, "Prototypes of Curriculum Evaluation," in The Oregon Studies, Vol. II, op. cit.

120. These handbooks include: B. S. Bloom, J. T. Hastings, and G. F. Madaus, Handbook on Formative and Summative Evaluation of Student Learning (New York: McGraw-Hill, 1971); Marcia Guttentag and Elmer L. Struening, ed., Handbook of Evaluation Research (Beverly Hills, Sage Publications, 1975); Anderson, Ball, Murphy et. al., Encyclopedia of Educational Evaluation, op. cit.; and Borich, Evaluating Educational Programs and Products,

op. cit. Another useful synthesis is Edward A. Suchman, Evaluative Research: Principles and Practice in Public Service and Social Action Programs (New York: Russell Sage Foundation, 1967).

A number of handbook-type reference works have also been published for practitioners, including the following: Lynn Lyons Morris, Carol Tyler Fitz-Gibbon, and Marlene E. Heverson, Program Evaluation Kit (Beverly Hills: Sage Publications, 1978); Bruce W. Tuckman, Evaluating Instructional Programs (Rockleigh, N. J.: Allyn and Bacon, Longwood Division, 1979); and John M. Gottman and Robert E. Clasen, Evaluation in Education: A Practitioner's Guide (Itasca, Illinois: F. E. Peacock, 1972).

121. For instance, see Selma J. Mushkin, "Evaluations: Use with Caution," Evaluation, Vol. 1, No. 2, 1973; William L. Speizman, "Evaluation: An Evaluation from a Sociological Perspective," 1974 Yearbook of the National Society for the Study of Education (Chicago: University of Chicago Press, 1974); Egon G. Guba, "The Failure of Educational Evaluation," Educational Technology, Vol. 9, No. 5, 1969, reprinted in Weiss, Evaluating Action Programs, op. cit.; and Carol H. Weiss, "The Politicization of Evaluation Research," in Weiss, Evaluating Action Programs, op. cit.; and "Significant Differences on the Social Insignificance of Statistical Significance -- A Plea for New Strategies of Evaluation," Educational Researcher (Newsletter), Vol. 20, October 1969.

122. See our chapter on the evaluation research function in educational R/D&I. Among the sources useful for gaining an insight into some of these dilemmas, see: R. W. Tyler, ed., Educational Evaluation: New Roles, New Means, 68th Yearbook of the National Society for the Study of Education, Part II (Chicago: University of Chicago Press, 1969), and especially the following articles in the yearbook: Benjamin S. Bloom, "Some Theoretical Issues Relating to Educational Evaluation," and Robert E. Stake and Terry Denny, "Needed Concepts and Techniques for Utilizing More Fully the Potential of Evaluation." Also see the excellent selection of articles (and bibliography) in Weiss, Evaluating Action Programs, op. cit. Also: Peter H. Rossi and Walter Williams, ed., Evaluating Social Programs: Theory, Practice, and Politics (New York: Seminar Press, 1972); W. W. Charters, Jr. and John E. Jones, "On the Risk of Appraising Non-Events in Program Evaluation," Educational Researcher, Vol. 2, No. 11, November 1973; John W. Evans, "Evaluating Education Programs - Are We Getting Anywhere?" Educational Researcher, Vol. 3, No. 8, September 1974; Carol H. Weiss, "Where Politics and Evaluation Research Meet," Evaluation, Vol. 1, No. 3, 1973; Ernest R. House, ed., School Evaluation: The Politics and Process (Berkeley: McCutchan, 1973); Ilene N. Bernstein, "Validity Issues in Evaluative Research," Sociological Methods and Research, August 1975; and Francis G. Caro, "Issues in the Evaluation of Social Programs," Review of Educational Research, Vol. 41, No. 2, April 1971.

123. See especially Ronald G. Havelock, "Dissemination and Translation Roles," in Eidell and Kitchel, Knowledge Production and Utilization in Educational Administration, op. cit.; R. G. Havelock and K. D. Benne, "An

Exploratory Study of Knowledge Utilization," in G. Watson, ed., Concepts for Social Change (Washington: National Training Laboratories, NEA, 1967); and the following Crusk publications: Ronald Havelock, A Comparative Study of the Literature on Dissemination and Utilization of Scientific Knowledge, 1968, Havelock et. al., Planning for Innovation through Dissemination and Utilization of Knowledge, op. cit.; Ronald G. Havelock, A Guide to Innovation in Education, 1970 (republished by Educational Technology Publications in 1973 as The Change Agent's Guide to Innovation in Education); and Ronald Havelock and Mary Havelock, Educational Innovation in the United States, 1973.

124. Havelock, Guskin, Frohman, Havelock, Hill, and Huber, Planning for Innovation through Dissemination and Utilization of Knowledge, op. cit.

125. For details on this, see our chapter on the dissemination function in educational R/D&I.

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127. See the exemplary development projects included in The Oregon Studies: Harry L. Ammerman, Darrell Clukey, and Gregory P. Thomas, eds., The Oregon Studies in Research, Development, Diffusion and Evaluation, Vol. IV: Case Profiles (Monmouth, Oregon: Teaching Research Division, Oregon State System of Higher Education, 1972). Also see the materials included in Hemphill and Rosenau, Educational Development: A New Discipline, op. cit.

128. Hemphill and Rosenau, Educational Development: A New Discipline, op. cit. and R. L. Baker and R. E. Schutz, eds., Instructional Product Development (New York: Van Nostrand Reinhold, 1971). We were able to review only the Hemphill and Rosenau volume.

129. For discussions of this literature, see our chapters on the acquisition function and the implementation/utilization functions in educational R/D&I.

130. See especially: Everett M. Rogers, Diffusion of Innovations (New York: The Free Press, 1962); and Mathew B. Miles, "Innovation in Education: Some Generalizations," in Innovation in Education, Mathew B. Miles, ed. (New York: Bureau of Publications, Teachers College, Columbia University, 1964).

131. For instance, see: Seymour B. Sarason, The Culture of the School and the Problem of Change (Boston: Allyn and Bacon, 1971); Neal Gross, Joseph B. Giacquinta and Marilyn Bernstein, Implementing Organizational Innovations: A Sociological Analysis of Planned Educational Change (New York: Basic Books, 1971); L. M. Smith and P. M. Keith, Anatomy of Educational Innovation (New York: Wiley, 1971); and the publications from the Rand Corporations, Change Agent Study, see especially the summary volume, Paul Berman and Milbrey Wallin McLaughlin, Federal Programs Supporting Educational Change, Vol. IV: The Findings in Review (Santa Monica: Rand Corporation, 1975).

132. See especially Havelock, The Change Agent's Guide to Innovation in Education, op. cit.

133. For instance, see: Richard A. Schmuck and Mathew B. Miles, Organization Development in Schools (Palo Alto: Mayfield Publishing Co., 1971); and Richard A. Schmuck, Philip J. Runkel, S. L. Saturen, R. T. Martell, and C. B. Derr, Handbook of Organization Development in Schools (Palo Alto: Mayfield Publishing Co., 1972).

134. National Institute of Education, Request for Proposals for a Survey of Institutions Which Perform Educational R&D - Research, Development, Dissemination, Evaluation and Policy Studies (Washington: NIE, 1976).

135. These materials are drawn from Radnor, Hofler, and Spivak, Draft Materials Prepared for NCER 1977 Report to Congress, op. cit.

136. This 30 includes only the 20 original regional laboratories and 10 original R&D centers. It does not include the additional vocational education research centers, and other miscellaneous centers created in addition to these 30, some of which are still in existence and included among the 17 institutions now classified under the "labs and centers" rubric. Of these 30, only 14 remain, plus an additional 3 miscellaneous centers. For clarification on this, see footnote 14 above and NIE, Databook, op. cit., pp. 39-43.

137. OE, Educational Research and Development in the United States, op. cit.; Francis S. Chase, "The Educational Laboratories: How Do They Fit Into the Future of American Education," reprinted in Chase, The National Program of Education Laboratories, op. cit.; David L. Clark, "Federal Policy in Educational Research and Development," Educational Researcher, Vol. 5, No. 1, January 1976.

138. Bailey, "Emergence of the Laboratory Program," op. cit.; Chase, The National Program of Educational Laboratories, op. cit.

139. For instance, see Bloom article in Journal of Research and Development in Education, Vol. 1, No. 4, op. cit.

140. "Clearinghouse Merger Follows Rand's Report on ERIC Network," op. cit.; and Davis, "CICE: A Question of Cost?" op. cit.

141. Westinghouse Learning Corporation is one example of this.

142. NIE, Preliminary Program Plans, FY 78. Executive Summary, op. cit.

143. For a description of the pretest results of this survey, see Joanne Frankel, Albert D. Biderman, and Laure M. Sharp, Registry and Survey of Research Organizations in Education (Washington: Bureau of Social Science Research, Inc., 1977). Preliminary analyses of the full survey data are scheduled for presentation in four symposia at the AERA annual meeting in San Francisco in April 1979.

144. Clark and Hopkins, A Report on Educational Research, Development and Diffusion Manpower, op. cit.; OE, Educational Research and Development in the United States, op. cit; and NIE, 1976 Databook, op. cit.

145. Roald F. Campbell et al., R&D Funding Policies of the National Institute of Education: Review and Recommendations, Final Report of Consultants to the Director and the National Council on Educational Research (Washington: NIE, 1975).

146. Clark and Hopkins, A Report on Educational Research, Development and Diffusion Manpower, op. cit.; J. E. Hopkins, An Updating of the Clark-Hopkins Manpower Projections AERA Task Force Technical Paper No. 25 (Washington: AERA, 1971); NIE, 1976 Databook, op. cit; and also see demographic data on AERA members published annually in recent years in the Educational Researcher, such as Bernard J. Fleury, Jr., Emma M. Cappeluzzo, and W. C. Wolf, Jr., "Demographic Data for Trainers of Educational Researchers," Educational Researcher (Newsletter), Vol. 21, April 1970; Arliss L. Roaden and Blaine R. Worthen, "A Profile of AERA Members as Researchers," Educational Researcher (Newsletter), Vol. 21, October 1970; and Joe A. Johnston, "AERA Members: A Profile, 1969, Educational Researcher (Newsletter), Vol. 21, December 1970.

147. Buswell et al., Training for Educational Research, op. cit.; Cronbach and Suppes, Research for Tomorrow's Schools, op. cit.

148. NIE, 1976 Databook, op. cit.; Guba, "The Place of Educational Research in Educational Change," op. cit.

149. NIE, 1976 Databook, op. cit.

150. For instance, see Sam D. Sieber, Analysis of USOE Research Training Programs, 1966-67 (New York: Bureau of Applied Social Research, Columbia University, 1968).

151. For instance, see: D. L. Stufflebeam, Proposal to Design New Patterns for Training Research, Development, Demonstration/Dissemination and Evaluation Personnel in Education (Washington: DHEW, 1970); Paul Hood, Final Report of a Design of a Survey for Determining Training and Personnel Requirements for Educational Research, Development, Dissemination, and Evaluation, 2 Volumes (Berkeley: Far West Laboratory for Educational Research and Development, 1972); and Richard A. Dershimer, W. James Popham, and William J. Russell, Development of Training Models for Educational Research: A Conceptual Scheme for a Professional Association (Washington: AERA, 1973).

152. H. Del Schalock, Gregory P. Thomas, Kevin R. Morse, Clark A. Smith, and Harry L. Ammerman, The Oregon Studies in Research, Development, Diffusion and Evaluation, Vol. I: Summary Report (Monmouth, Oregon: Teaching Research Division, Oregon State System of Higher Education, 1972).

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154. NIE, 1976 Databook, op. cit.

155. Sieber and Lazarsfeld, The Organization of Educational Research, op. cit.; OE, Educational Research and Development in the United States, op. cit.; and Levien, NIE: Preliminary Plan for the Proposed Institute, op. cit.

156. Carnot E. Nelson, William M. Sowers, and Ward S. Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: A Composite Estimate, by Agency, Using Four Data Bases (Washington: R&D System Support Division, Dissemination and Resources Group, NIE, 1977).

157. NIE, 1976 Databook, op. cit., p. 16.

158. For instance, see: Chase, The National Program of Educational Laboratories, op. cit.; Chase "The Educational Laboratories: How Do They Fit Into the Future of American Education?" op. cit.; Chase, "Educational Research and Development in the Sixties: The Mixed Report Card," op. cit.; Chase, "The Laboratories: 1970 and Beyond," op. cit.; and Bailey, "Significance of the Federal Investment in Educational R&D," op. cit.

159. Michael Radnor, Harriet Spivak, Durward Hofler, with Earl C. Young, Agency-Field Relationships in the Educational R/D&I System: A Policy

Analysis for the National Institute of Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1976).

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163. Cooley, as cited in Tyler, "Analysis of Stengths and Weaknesses in Current Research in Science Education," op. cit.

164. Stake, "The Countenance of Educational Evaluetion," op. cit.

165. One example of this is the controversy over the national impact study of the Head Start program. A good discussion of this controversy is to be found in Jerome Hellmuth, ed., Disadvantaged Child, Vol. 3, Compensatory Education: A National Debate (New York: Brunner/Mazel, 1970), Chapters 9-10 c: Sheldon H. White, "The National Impact Study of Head Start;" Donald T. Campbell and Albert Erlebacher, "How Repression Artifacts in Quasi-Experimental Evaluations Can Mistakenly Make Compensatory Education Look Harmful;" Victor C. Cicirelli, "The Relevance of the Regression Artifact Problem to the Westinghouse-Ohio Evaluation of Head Start: A Reply to Campbell and Erlebacher;" John W. Evans and Jeffry Schiller, "How Preoccupation with Possible Regression Artifacts Can Lead to a Faulty Strategy for the Evaluation of Social Action Programs: A Reply to Campbell and Erlebacher;" and Donald T. Campbell and Albert Erlebacher, "Reply to the Replies." The controversy over the Coleman Report to another case in point, as illustrated by two particularly useful volumes: Harvard Educational Review, "Equal Educational Opportunity" (Cambridge: Harvard University Press, 1969), (a republication of the special issue of the Harvard Educational Review published in Winter 1968); and Frederick Mosteller and Daniel P. Moynihan ed., On Equality of Educational Opportunity (New York: Vintage Books, 1972).

166. The Oregon Studies, Vol. I, op. cit.; David L. Clark, "Strategies and Dynamics in Changing Educational Practice," in The Oregon Studies, Vol. II, op. cit.; The Role of Research in Development," in The Oregon Studies, Vol. II, op. cit.; Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.; and Randall, "An Operational Application of the CIPP Model for Evaluation," op. cit.

167. Cronback and Suppes, Research for Tomorrow's Schools, op. cit., pp. 249-50.

168. Schalock, Thomas, Morse, Smith, and Ammerman, The Oregon Studies, Vol. I, op. cit.; Robert M. Gagne, "Qualifications of Professionals in Educational R&D," Educational Researcher, Vol. 4, No. 2, February 1975; and Joint Committee (Stufflebeam et al.), Standards for Evaluations of Educational Programs, Projects, and Materials, op. cit.

169. On this, see for instance, Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

170. Schalock, Thomas, Morse, Smith, and Ammerman, The Oregon Studies, Vol. I., op. cit.; H. Del Schalock and G. Roger Sell, "A Framework for the Analysis and Empirical Investigation of Educational R,D,D, &E," in The Oregon Studies, Vol. III, op. cit.; B. R. Worthen and R. M. Gagne, The Development of a Classification System for Functions and Skills Required of Research and Research-Related Personnel in Education, Technical Paper No. 1 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1969); B. R. Worthen and J. R. Landers, The Development of and Interview Technique to Collect Data on Importance and Availability of Selected Competencies in Research, Development Diffusion, and Evaluation (Boulder, Colorado: Laboratory of Educational Research, University of Colorado, 1970); J. R. Sanders and B. R. Worthen, An Analysis of Employers' Perceptions of the Relative Importance of Selected Research and Research-Related Competencies and Shortages of Personnel with Such Competencies (Boulder, Colorado: Laboratory of Educational Research, University of Colorado, 1970); G. V. Glass and B. R. Worthen, Interrelationship Among Research and Research-Related Roles in Education: A Conceptual Framework, Technical Paper No. 4 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1970); G. V. Glass and B. R. Worthen, Essential Knowledge and Skills for Educational Research and Evaluation, Technical Paper No. 5 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1970); A. R. Coller, A Taxonomy of Programmatic Tasks in an Educational Evaluation Facilitation and Coordination System (Northfield, Illinois: Cooperative Educational Research Laboratory, Inc., 1970 (USOE Contract OEC-3-3061391-3061); R. D. Anderson, J. M. Soptick, W. T. Rogers, and B. R. Worthen, An Analysis and Interpretation of Tasks and Competencies Required of Personnel Conducting Exemplary Research and Research-

Related Activities in Education, Technical Paper No. 23 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1971); B. R. Worthen, Some Tasks and Competencies Frequently Required in Educational Research and Evaluation, Research, Evaluation, and Development Paper No. 5 (Portland, Oregon: Northwest Regional Educational Laboratory, 1974); B. R. Worthen, "Competencies for Educational Research and Evaluation," Educational Researcher, Vol. 4, No. 1, January 1975.

171. Ibid.

172. Schalock, Thomas, Morse, Smith, and Ammerman, The Oregon Studies, Vol. I, op. cit.

173. See especially our chapters on information flow and on the need identification, acquisition, and dissemination functions.

174. See our chapter on the dissemination function.

175. For instance, see: Lazarsfeld and Sieber, Organizing Educational Research, op. cit.; Hood, "Dissemination, Distribution, and Utilization of Laboratory Products," op. cit.; Pincus, "Incentives for Innovation in the Public Schools," op. cit.; Havelock et al., Planning for Innovation through Dissemination and Utilization of Knowledge, op. cit.; Sarason, The Culture of the School, op. cit.; Sam D. Sieber, "Organizational Influences on Innovative Roles," in Knowledge Production and Utilization in Educational Administration, T. Eidell and J. M. Kitchel, eds. (Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1978); and Richard O. Carlson, Adoption of Educational Innovations (Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1965); Lindeman, Bailey, Berke, and Naum, Some Aspects of Educational Research and Development in the United States, op. cit.; and OE, Educational Research and Development in the United States, op. cit., pp. 147-153.

176. The most significant exceptions here are the AERA sysmposium published as Dershimer, ed., The Educational Research Community: Its Communication and Social Structure, op. cit.; and the various analyses by Carnot E. Nelson and his associates discussed extensively in our chapter on information flows in education.

177. For instance, see: William J. Paisley, "The Role of Invisible Colleges," in Dershimer, ed., The Educational Research Community: Its Communication and Social Structure, op. cit. (republished in revised form in the Educational Researcher, Vol. I, No. 4, April 1972; Dershimer, The Federal Government and Educational R&D, op. cit.; and Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

178. Dershimer, ed., The Educational Research Community: Its Communication and Social Structure, op. cit.

179. Chase, "The Educational Laboratories: How Do They Fit into the Future of American Education?", op. cit.

180. For instance, see: Henry M. Brickell, Organizing New York State for Educational Change (Albany: New York State Department of Education, 1961); Gaba, "The Place of Educational Research in Educational Change," op. cit.; OE, Educational Research and Development in the United States, op. cit.; Bailey, "Significance of the Federal Investment in Educational R&D," op. cit.; Lindeman, Bailey, Berke, and Naum, Some Aspects of Educational Research and Development in the United States, op. cit.; Sarason, The Culture of the School, op. cit.; Goodlad et al., Behind the Classroom Door, op. cit.; Havelock and Havelock, Educational Innovation in the United States, op. cit.; G. A. Clifford, "History of the Impact of Research on Teaching," in Travers, Second Handbook of Research on Teaching, op. cit.; Philip Jackson and Sara B. Kieslar, "Fundamental Research and Education," Educational Researcher, Vol. 6, No. 8, September 1977; Kiesler and Turner, Fundamental Research and the Process of Education, op. cit.; and Fred N. Kerlinger, "The Influence of Research on Education Practice," Educational Researcher, Vol. 6, No. 8, September 1977.

181. Brichell, Organizing New York State for Educational Change, op. cit.

182. Ronald G. Havelock, "Dissemination and Translation Roles in Education and Other Fields," in Eidell and Kitchel, Knowledge Production and Utilization in Educational Administration, op. cit.; Pincus, "Incentives for Innovation in the Public Schools," op. cit.

183. For instance, see the chapters on the need identification, dissemination, acquisition, and implementation/utilization functions and on information flows.

184. For instance, see Brownell in Journal of Research and Development in Education, Vol. 1, No. 4, Summer 1968; NIE, "RFP to Establish an 'R&D Dissemination and Feed forward System'," op. cit.; Radnor, Hofler, and Rich, Information Dissemination and Exchange for Educational Innovation, op. cit., especially the following two chapters: Susan Klein, Richard McCann, and Mary Saily, "The R&D Exchange: An Emerging Effort," and Michael Radnor, Robert Rich, and Durward Hofler, "The RD_x System: Concepts, Strategies, Practices -- An Overview;" Hendrik D. Gideonse, "Elements of National Science Policy: A Perspective from the Behavioral and Social Sciences," in The Oregon Studies, Vol. II, op. cit.; Hendrik D. Gideonse, "Research, Development and the Improvement of Education," Science, Vol. 162, November 1, 1968 (reprinted in The Oregon Studies, Vol. II, op. cit.; and T. H. Bell, "Educational Research and the Public Interest," Educational Research, Vol. 4, No. 6, June 1975.

185. See especially Gideonse, "Research and Development in Education: A Market Model," op. cit.; Gideonse, "Elements of National Science Policy: A Perspective from the Behavioral and Social Sciences," op. cit.; and Gideonse, "Research, Development and the Improvement of Education," op. cit.

186. For an especially good analysis of the wide range of organizational types involved in linkage activities in education, see Matilda Butler-Paisley and William Paisley, Communication for Change in Education: Educational Linkage Programs in the 1970's (Palo Alto: Institute for Communication Research, Stanford University, 1975).

187. See, for instance: James Welch, "Renewal: The Latest Word," Educational Researcher, Vol. 1, No. 2, February 1972; Philip J. Runkel, Linking Organizations to Maintain Organizational Development and Transmit Innovation (Eugene: Center for the Advanced Study of Educational Administration, University of Oregon, 1970); Miles, Organization Development in Schools, op. cit.; Schmuck, Runkel, Saturen, Martell, and Derr, Handbook of Organization Development in Schools, op. cit. For more on this, see our chapter on the implementation and utilization functions in education.

188. The best of these is probably Havelock, The Change Agent's Guide to Innovation in Education, op. cit.

189. For instance, see: Becker, "Incorporating the Products of Educational Development into Practice," op. cit.; and Paul D. Hood, "Dissemination, Distribution, and Utilization of Laboratory Products," reprinted in The Oregon Studies, Vol. II, op. cit. and also reprinted in Hemphill and Rosenau, Development: A New Discipline, op. cit.

190. See our chapter on the dissemination function in educational R/D&I.

191. See our dissemination chapter.

192. NIE's Dissemination and Technical Assistance in Urban Schools Project. However, this project was not successful in producing useful materials.

193. A brief description of this program and what happened to it is included in Dershimer, The Federal Government and Educational R&D, op. cit.

194. National Institute of Education, Catalog of NIE Education Products (Washington: NIE, 1976).

195. Ibid.; NIE, 1976 Databook, op. cit.

196. For instance, see: Council for Educational Development and Research, CEDaR Catalog of Selected Educational Research and Development Programs and Products (Denver: CEDaR, 1972); S. N. Henrie, ed., ALERT: A Sourcebook of Elementary Curricula Programs and Products (San Francisco: Far West Laboratory for Educational Research and Development, 1972); D. W. Kratochvil et al., Product Development Reports (Palo Alto: American Institute for Research, 1971-72); Mortimer Smith, Richard Peck, and George Weber, A Consumer's Guide to Educational Innovations (Washington: Council for Basic Education, 1972); B. J.

Turnbull et al., Promoting Change in Schools: A Diffusion Casebook (San Francisco: Far West Laboratory for Educational Research and Development, 1974).

197. These projects include the PSSC physics program, the BSCS biology program, the CHEM chemistry program, the SMSG mathematics program. For a summary of impact data on these programs, see OE, Educational Research and Development in the United States, op. cit.

198. For instance, see: Chase, The National Program of Educational Laboratories, op. cit.; Walter R. Borge, "Educational Research and Development and Educational Change," in Hemphill and Rosenau, Educational Development: A New Discipline, op. cit.; Becker, "Incorporating the Products of Educational Development into Practice," op. cit.; Chase, "Educational Research and Development in the Sixties: The Mixed Report Card," op. cit.; and Chase, "R&D in the Remodeling of Edudation," op. cit. For an interesting case study on the development of Sesame Street, see The Oregon Studies, Vol. IV, op. cit.

199. NIE, 1976 Databook, op. cit., pp. 52-55. The two projects that identified these exemplary outputs are described in Kratochvil, Product Development Reports, op. cit. and Turnbull, Promoting Change in Schools, op. cit.

200. For instance, see: OE, Educational Research and Development in the United States, op. cit., pp. 139-153; J. W. Getzels, "Paradigm and Practice: On the Contributions of Research to Education," as cited in ibid.; Daniel E. Griffiths, "The Ten Most Significant Educational Research Findings in the Past Ten Years," in The Oregon Studies, Vol. II, op. cit.; Cronbach and Suppes, op. cit.; and Keisler and Turner, Fundamental Research and the Process of Education (National Academy of Sciences Report), op. cit.

201. Chase, "R&D in the Remodelling of Education," op. cit.; Chase, "The Laboratories: 1970 and Beyond," Chase, "Educational Research and Development in the Sixties: The Mixed Report Card," op. cit.

202. Chase, "Educational Research and Development in the Sixties: The Mixed Report Card," op. cit.

203 Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

204. Carnot E. Nelson and Ward S. Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency (Washington: R&D System Support Division, NIE, 1977), pp. 33-34, Tables 15-16.

205. Ibid, p. 52.

206. National Council on Educational Research, Resolution NCER-GP-77-0[illegible], September 16, 1977.

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER TWO

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CHAPTER TWO

ENVIRONMENT

CONTENTS

CONTENTS (Continued)

FIGURES

All R/D&I systems are significantly affected by the environments in which they operate. A system's environment influences the nature, quantity, and quality of inputs provided to support system functioning. And too, with some degree of variability from system to system, the environment affects the demands made on a system, as to what it should or should not do, can or cannot do. Consequently, the pervasive effects of a system's environment can be traced throughout virtually every dimension of system functioning -- on the determination of goals, priorities, policies, and strategies; on the identification of needs; on the kinds, levels, and quality of such inputs as personnel and funding; and on the manner in which, and the effectiveness with which, these system inputs are utilized in the performance of system functions.

Since R/D&I involves change-producing processes, the direction of influence can run both ways -- not only from the environment to a system, but also from a system to its environment. R&D outputs can produce major transformations in user systems in a particular sector. If sufficiently consequential (e.g., the atomic bomb, or computer technology), ripples of these effects may be discerned in and perhaps even bring about significant transformations themselves in, the broader social, cultural, economic, technological, and political environment. At the very least, the success of an R/D&I system in producing observable gains will affect, perhaps more than any other factor, the esteem in which the system is held, the degree of support its leaders are able to muster, and the nature, level, and quality of inputs likely to flow to the system in the future.

An understanding of environmental influence is especially important to grasp the difficulties of educational R/D&I functioning, and the serious constraints that must be taken into account in developing feasible policy options and management strategies for this system...Of all the sectors we have considered in our comparative analysis, education is clearly the most vulnerable[1] -- the most open to, and subject to, social and political influence. There are several reasons for this vulnerability, and we consider them in some detail. We then examine some of the problems the environment poses for educational R/D&I, the ways in which it affects R/D&I functioning, and consequently the extent to which environmental factors must be taken into account in assessing the feasibility of different policy options and management strategies. Next, we consider the question of possible policy interventions to transform the environment into one more favorable to educational R/D&I. We analyze the interrelated web of influences on environment-system boundary transactions, and suggest the extent to which different environmental factors must be viewed as fixed or as amenable to various types of policy interventions with various degrees of likely impact over the short and the long run. Finally, we try to sum up our assessment of where the field is at this point in time in : (a) understanding environmental influences on educational R/D&I, and (b) using this understanding to formulate policy options that might improve this environment and make it more supportive of the educational R/D&I. We consider the literature (what is and what is not there), some key questions in need of research, and some thoughts on how we might proceed both to further our understanding and to use this understanding to assist in the development of educational R&D policy.

I. WHY THE EDUCATION SECTOR IS SO VULNERABLE TO ENVIRONMENTAL INFLUENCE

The education sector's high degree of vulnerability to social and political influence is attributable to several factors: the nature of education as an institution; the nature and status of the knowledge and technology base of the field; the nature of educational innovations; and the governance structure of education and educational R/D&I in this country, and its resultant dependence on political processes for needed resources. We consider each of these factors in turn.

1. The Nature of Education as an Institution

A. A Public Service Institution

Schools are a public service institution supported by public funds and administered and regulated by public agencies. Therefore, they affect all subgroups of the population, as citizens and taxpayers. Since the proportion of local funds spent on public education tends to be quite high, and in many localities school taxes, bond issues, and budgets are voted on in special elections, schools tend to be more salient to taxpayers than any of the other sectors we have considered in our comparative analysis.

B. Faith in Education as the Key to Future Success

For those taxpayers who are parents of school-age children, the level of concern about school functioning tends to be even higher.[2] American society has been characterized by tremendously high expectations for schooling. One writer has described this as "the great school legend"[3] -- faith in education as the great social leveler, the key to occupational mobility and future success. Recent research has cast some doubt on the validity of this belief, suggesting instead that home environment is more critical than school factors in explaining differences in academic achievement levels and future occupational status.[4] If this is indeed true, and if schooling as an institution (and educational R/D&I as a support system for that institution) is inadequate to meet society's high expectations, then this helps to explain the extreme vulnerability of the education sector and the intensity with which it has come under attack in recent years.

C. Education as Key to Work Force Preparation

Taxpayers and parents are not the only sectors of the public who have been expressing concern over school functioning in recent years. Leaders of industry and business have been bemoaning the poor quality of work force preparation for the world of work. Many companies have been forced to develop extensive training programs, at considerable expense to themselves, to overcome the problem of finding sufficient numbers of qualified personnel to fill positions requiring little more than functional literacy and minimal arithmetic skills. Characteristic of the concern of the business committee is a trenchant statement made by the Committee for Economic Development, an organization of leaders of business and industry: "The nation cannot afford to waste its resources by investing them in schools that fail to achieve the level of operational efficiency and effectiveness in instruction which is now within their reach."[5]

D. Diffuseness and Value-Laden Nature of Educational Goals

The education sector, then, evokes a higher level of concern among its relevant publics than other sectors we have considered in our analysis. Education, by its nature, also has more diffuse goals than other sectors -- goals that are more subject to value judgments, misinterpretation, and controversy; and goals that are harder to specify, less measurable, and harder to use as performance standards against which to judge system performance. What precisely is meant when it is said that schools should educate students? And, education toward what ends? Philosophers have been debating the ends of education for centuries. Similarly, there may be some agreement that the end goal of educational R/D&I is to improve educational practice. But what precisely does that mean, and how do we measure such improvement? Given the diffuseness and value-laden nature of educational goals compared to other sectors, the functioning and effectiveness of educators and educational R/D&I personnel are more likely to be subject to scrutiny and debate.

2. The Knowledge and Technology Base of the Field

A. Relatively Limited Specialized Expertise Required Compared To Other Professions

Contributing to the vulnerability of the education sectors is the educator's legitimacy problems in claiming specialized expertise and professional status. Compared to doctors, lawyers, scientists, or engineers, the specialized training needed to function as a teacher or principal does not seem particularly awesome. We do not mean that school professionals are not accorded a considerable amount of respect and some awe by parents in general. Public opinion data strongly support the impression that most parents in most localities express substantial admiration for educators.[6] However, were comparative data available, few would doubt that even the most respectful parent would be more likely to question the functioning of a teacher than a doctor, lawyer, scientist, engineer, fireman, or even a farmer.

The reason, clearly, involves familiarity with what the teacher does -- from personal experience and from close observation of the experiences of others. Virtually everyone has attended school and therefore knows from personal experience what teachers do and how, and probably too with what degrees of adequacy.

There is considerably more mystique surrounding less familiar occupations, even those that may require less formal training. (An urban mother, for instance, would be far more likely to question how a given teacher interacts with her students than what a farmer does in growing his crops.) Parents help children with their homework and frequently engage in teaching their children one thing or another. Therefore, particularly for the better educated parent, there is far less of a gap in expertise between the general public and other professions or fields with strong knowledge or skill bases.

Similarly, compared to fields with well developed knowledge and technology bases and highly specialized development (e.g., engineering) activities, there does not appear to be much of a gap in expertise between the R&D personnel who develop many of the learning materials on the market and the teachers who develop their own materials, or even the parents who peruse the materials used by their children. Consequently, the mystique that surrounds R&D in other sectors is generally lacking in education, and a Congressman, or a parent, or a school professional is more likely to question the wisdom of investing public resources in a given R&D project in education than in, let us say, public health, or agriculture, or aerospace or defense.

B. Weakness of the Scientific and Technological Base: Education as an Applied Social Science Field

The weakness of the scientific and technological base of education and educational R/D&I is at the crux of much of the environmental vulnerability of this sector. Education is particularly vulnerable on this, but it shares much common ground with the social sciences and other applied social science fields as well. The past three decades of "big science," close ties between the federal government and the scientific community, and enormous scientific and technological progress have substantially reinforced our society's highly positive attitudes toward science and great expectations about the benefits to be expected from the application of science and technology to any and all problems. In the '60s, the mystique generated by the natural sciences was generalized to the social sciences, ~~and it~~ was widely assumed that social problems would be as amenable to solution as the natural science puzzles unlocked and harnessed in the previous decades. The federal investment in the social sciences expanded considerably, and with it the investment in such applied areas as education. But by the late '60s, these high expectations eroded into disillusionment,[7] in part because the expectations based on experience with the natural sciences had been so high. As a consequence, we have been seeing in recent years intensive questioning of the wisdom of expending federal funds on social research, or such applied social areas as educational R/D&I.

C. Weakness of the Scientific and Technological Base: Education as a "Derivative" Discipline

All fields with social science knowledge bases face far greater difficulties in conducting research and R/D&I activities than fields with natural science bases. We consider some of these difficulties later in this chapter when we examine how environmental factors such as the nature of the field's knowledge base affect R/D&I functioning in education. But what must be underscored here in explaining why the education sector is particularly vulnerable is the weakness of the education and educational R/D&I knowledge and technology base, even in comparison to other social science fields. The education knowledge base is made up of areas of specialization that can be called, at best, "derivative disciplines" (educational psychology, educational sociology, etc.), with weak links to the parent disciplines. The problem with derivative disciplines is that they generally fail to transmit the full power of the theoretical paradigms and inquiry technologies of the parent disciplines.[8] Inquiry in the field is not structured by powerful paradigms. Consequently, the knowledge base is fragmentary and non-cumulative, and has extensive gaps. Research and R/D&I methodology are weak. And research and R/D&I personnel are trained inadequately in rigorous procedures for research design, instrumentation, data analysis, product development and testing, evaluation, etc. The field generally lacks valid, reliable instrumentation for measurement and evaluation -- the most basic of all requirements for effective conduct of research and R/D&I activities.

As a result of these problems, progress in educational R/D&I has been slow. Generally lacking are the kinds of impressive system outputs that legitimate R/D&I activities, give a system prestige, and generate sufficient support to guarantee an influx of resources. What makes the system so vulnerable is not simply the lack of significant outputs to date, but the suspicion, given the weaknesses of the field's knowledge and technology base, that the system is unlikely to produce significant outputs in the future either -- regardless of the size of the investment that might be made in the educational R/D&I system.

3. The Nature of Educational Innovations

Adding to the vulnerability of educational R/D&I is the nature of educational innovations compared to the more technological outputs of R/D&I systems in other sectors. Technological products are easily packaged and installed. Their use rarely conflicts with the values, attitudes, and sensitivities of operating system personnel. The products can be expected to behave reliably in accordance with their performance specifications as long as they are used properly.

Educational innovations, in contrast, tend to involve "people change"[9] -- e.g., creation of new capabilities or organizational strategies or instructional approaches. They are therefore more likely to be resisted, by the people who make adoption decisions and those who must implement them. As "people-change" products, there is far greater reactiveness between product and users (both school personnel as intermediate users and students as end users). This interaction between the innovation itself and the human element in the implementation process makes implementation far more difficult, and effects far less predictable. Innovations of this kind cannot be judged successful until the new capabilities, approaches, etc. have been incorporated effectively into the daily practice of the user system and have had the expected effects on the target students as end users. The effects of major innovations may take years to become visible -- for instance, how long does it take to create a humane learning environment, and children who behave more humanely towards others? And such effects may be far more difficult to measure than, let us say, the effectiveness of a new engine design to reduce fuel consumption, or a new strain of hybrid corn for producing a higher crop yield. How do we know we have created individuals who are more "humane"? How do we operationalize and measure such a goal, or set performance specifications for an innovative program to reorganize school learning environments to achieve this objective?

Clearly, we have overdrawn the contrast and taken a particularly amorphous educational innovation to illustrate our point. But having admitted that, the point we are trying to make still seems valid. Educational innovations by their very nature tend to be more vulnerable to criticism. They are more likely to come into conflict with strongly held attitudes and values. They are harder to implement effectively. And even if they are effective, they are harder to prove effective:

their effects are harder to demonstrate objectively and are therefore more subject to dispute.

4. Governance Structures

Of all the environmental factors that make the education sector vulnerable to social and political influence, the one that has the most visible and direct effect on system functioning is the governance structure of education and educational R/D&I in this country.

A. Governance of Public Education

School systems are legally controlled by agencies in their environment. Both school systems and educational R/D&I institutions are largely dependent on these agencies for their funding. Legal control over the operating system is vested in lay boards of education, elected or appointed by elected officials in each of the 17,000 or so school districts across the country. This lay control, its relationship to political processes, and its extreme decentralization are factors of some consequence. Although professional (i.e., the Superintendent) dominance of the lay boards of education is the rule, there are frequent exceptions. And the fact that the Superintendent is appointed by and accountable to the lay boards means that unless the Superintendent is a person with strong leadership abilities and a clear vision of the kind of education he wants his district to provide, community pressures can have a major impact on school functioning, especially in matters involving controversy and strong feelings (e.g., bussing or sex education).

In terms of formal governance structures, the educational system in the U.S. is characterized by extreme decentralization. In contrast to nations with highly centralized school systems, with centrally prescribed courses, textbooks, and learning materials, centrally developed examination systems, and extensive monitoring of school operations by school inspectors, each of the 17,000 or so local school districts in this country is largely autonomous. Legally, authority to establish and regulate schools in this country is vested in the governments of the fifty States. Operationally, however, most decision making authority and virtually total responsibility for running the schools is delegated to the Local Education Agencies (LEAs). In most states, the regulatory role of the State Education Agency (SEA) is minimal, and the monitoring function is almost nonexistent. Decisions about curriculum, personnel, learning materials, budgets and the like are made locally. There are exceptions to this rule -- for instance, statewide textbook adoption in many of the states. State agencies do perform some regulatory functions in an attempt to insure minimum performance standards -- e.g., accreditation of educational institutions and certification of teachers. But for most school districts in most states, the role and influence of the SEAs is difficult to discern. This situation is beginning to change with more and more SEAs exercising positive leadership functions. However, it is too early to assess the degree of impact of this new, strong, SEA leadership.

The Federal role in education has become prominent since the early '60s with the infusion of large sums of new Federal money for specified purposes (e.g., ESEA Title I and Title III funds). However, even when Federal funds were disbursed presumably to be spent in accord with Federal guidelines, it was not uncommon to find LEAs ignoring the guidelines and spending the money in a manner that flagrantly violated the guidelines and the Federal intent. And until recently, there was little Federal effort to sue for return of misspent funds.

Public school decisionmaking is decentralized, then, when analyzed in terms of general LEA operating autonomy from State or Federal authorities. In operational terms, decentralization tends to go considerably beyond the decisionmaking autonomy of the LEAs. Within each district, there is considerable autonomy at the school building level, in the hands of principals and also the teachers, who in most schools have a great deal of leeway in determining what happens in their classrooms despite the hierarchical, bureaucratic organization of school administration. This degree of autonomy down to the school and classroom level is a factor of considerable importance in explaining why innovations that are formally adopted by a school district are so often not implemented in practice, or are so transformed during implementation that they amount to little more than "the same old thing."[10] Given the extreme decentralization of decisionmaking in the system, and the extreme sensitivity school personnel demonstrate to even the possibility of community criticism, environmental influences continually intrude on school system decisionmaking -- not just once at the official school board level but again at the level of the school administration and again at the classroom level as well.

B. Governance of Educational R/D&I

Unlike the operational system of public education, the educational R/D&I system is not a "system" in the sense of being an integrated, coordinated set of easily definable, boundable units governed by a specific set of authorities who make policies, rules, and the like that are in turn carried out by all units of the system. (Even in the case of the operational system, this definition is more true on paper than in reality.) As we shall see in a later chapter when we consider the institutional configuration of what we have been calling the system, the units that make up the educational R/D&I system tend to be highly autonomous in terms of their R/D&I purposes and activities. To whatever extent the system is "governed" or even "managed", that governance is a concomitant of funding -- the sponsors of educational R/D&I can (and often do) tell contractors or grantees what they can (and, presumably but not always in fact, cannot) do with the sponsor's money, and occasionally how to proceed as well as what to produce. However, even within the Federal government, as we shall see in our chapter on funding, there are a large number of agencies that function as educational R/D&I sponsors. And, neither NIE (which was created to have key responsibility for federally-sponsored educational R/D&I) nor OE (which has the largest chunk of the available money for funding educational R/D&I) have functioned as yet as lead agencies to coordinate -- much less attempt any governance of -- educational R/D&I.

The system, then, is one that is largely ungoverned, not unlike R/D&I systems in other sectors. The problem here, however, is that there are no strong internal governance mechanisms for the field, such as a strong professional association that can regulate, or at least set standards for, the functioning of the field.

In a different sense (i.e., in the sence of influence over rather than formal governance of the field) the Congress, as the source of most educational R/D&I funds, is certainly a key element in the governance of the educational R/D&I system. Given the Congress' lack of confidence in the ability of educational R/D&I to provide a reasonable return on the taxpayers' investment, this has meant almost constant troubles for the educational R/D&I system until the past year or so in which, as discussed in a previous chapter, there has been an apparent truce between Congress and NIE/OE.

5. Economic Forces

Economic forces in the environment of the operating and R/D&I systems in the education sector have been felt particularly severely in recent years. On the State and local level, school system functioning has become one of the paramount issues of the day as we find increasing numbers of State and local communities struggling over equitable financing formulas, States cutting assistance to local districts as they struggle with their own financial difficulties, and voters in local districts defeating school budgets and bond issues in an effort to stave off further increases in local taxes. Economic recession has also meant a shortage of slack resources in the private sector to invest in high risk/low return R/D&I activities.

6. Supports, Demands, and Constituencies

In summary, we can characterize the environment of the education sector as one that is weak in supports for the system and assertive in demands about what can or cannot be done, what should or should not be done. R&D in education lacks prestige or legitimacy, or even a demand for its products or its very existence. This is apparent whether we focus on the attitudes of researchers and scholars in the disciplines, educational practitioners, laymen, members of Congress, or even the educational research and R&D communities. The system has developed no constituency of its own and is buffeted by the initiatives of various other constituencies able to articulate demands reflecting broad social, cultural, and political movements (e.g., demands for programs in black history or for materials that present more positive images of blacks, Hispanic-Americans, Native Americans, white ethnic groups, women, etc.).

II. HOW ENVIRONMENTAL INFLUENCES AFFECT SYSTEM FUNCTIONING

The environment of the education sector affects virtually every feature of the R/D&I system. It affects the definition of goals, needs, policies, and strategies. It affects the kinds, levels, and quality of inputs that flow into the system. Environmental influences can even be seen in the conduct of various system functions. We consider each of these areas of environmental influence briefly.

1. Definition of Goals and Needs: What will be studied? What will be funded?

Several writers who have discussed the definition of goals and needs in the education sector have commented on the tension between demands of the disciplines and fields of knowledge, on the one hand, and demands of the client system and society, on the other.[11] In selecting topics for research or R&D activities, for instance, the researcher is affected by his own interests, which are in turn affected by the particular disciplines in which he has been trained and socialized, by the differential prestige he perceives to be attached to particular disciplines and types of work, by his colleagues and the research subcultures in which they function, and by the particular institution(s) in which he works. But he is also affected by the desires of clients or sponsors who are willing to fund specific kinds of research or R/D&I activities that are congruent with their interests or perceived needs.

In educational R/D&I, clients and sponsors tend overwhelmingly to be governmental agencies -- Federal agencies, SEAs, and LEAs. Consequently, social/political movements affect their operations, their definition of goals, and their perceptions of program and product needs. In the late '50s, after the political shock of the Soviet launching of Sputnik I set in, program and product demands focused on the pursuit of excellence and development of the abilities of the gifted, especially in the sciences and mathematics.[12] Even more substantial revamping of school policies, programs, staffing, administration, and learning materials in the past two decades is traceable to such broad social and political environmental influences as the Supreme Court's school desegregation decisions and Federal court orders since 1954, the poverty program focus on the economically disadvantaged in the '60s, and the assertive ethnic and other "minorities" movements of recent years. As a result, the study of various desegregation strategies, their implementation, their impact on student attitudes and achievement, and their social, political, and demographic effects has emerged as an active research area. And too, development of human relations programs, crisis prevention programs, and the like have become the focus of a specialized area of development work. Design and evaluation of programs for the disadvantaged (e.g. Title I ESEA programs) and of materials focused on various minorities (e.g.: bilingual materials, materials concerned about and/or for Afro-Americans, Hispanic-Americans, Native Americans, and other groups, anti-sexist materials, etc.) have become booming industries.

Not only are user system operations and therefore program and product needs affected by these social and political forces in the broad environment of educational R/D&I; even the researchers' own interests and predilections are affected by these broad movements. Issues of race and poverty, for instance, have been particularly intriguing to researchers who became political conscious and politically socialized during the '50s and '60s. A number of analysts have noted the predominantly liberal and Democratic Party leanings of most social scientists, including educational R/D&I personnel. Therefore, in determining what research or R/D&I activities he will pursue, the researcher is affected by the intellectual problems and research subcultures of the disciplines in which he has been trained and socialized, his own political and social orientations and sensitivities, and the priorities defined by educational R/D&I clients and sponsors.

One further, even more directly political influence should be noted.

Political changes in Washington have had a major effect on educational research and R/D&I sponsorship. Political support for educational R/D&I, for instance, peaked during Lyndon Johnson's Great Society years, and dropped off substantially during the Nixon-Ford period. To take another example, foundation support for social reform initiatives was also quite considerable during the '60s, and dropped off substantially after that -- in part, it would seem, because large sponsors such as the Ford Foundation came to see themselves as having been "burned" by involvement in hot political issues such as school decentralization; but also, in part, because of the political threat to the foundations' tax-exempt status mobilized by opponents of some of these reform initiatives funded by the foundations. Clearly, then educational R/D&I funding is as much if not more affected by broad political forces in the system's environment as by any internal system developments or internally defined needs or plans.

2. The Personnel Pool

The effect of environmental influences on such system inputs as funding, then, is obvious. Perhaps less apparent, though no less critical, is the effect of environmental influences on the personnel pool available to meet system needs. We have commented in several chapters on the relatively low prestige of educational R/D&I and how this affects the system's ability to attract high calibre personnel to the field. The low prestige of the field tends to discourage capable social scientists or established researchers from other fields from joining R/D&I institutions or projects in the education sector. Talented students deciding on future career opportunities are diverted from possible interest in education to work in other KPU systems that have more prestige and seem to offer better chances for significant achievement and recognition from their reference group. The prestige/personnel problem is difficult to solve because the relevant factors are interrelated in a vicious circle: the low prestige of the field makes it hard for educational R/D&I to attract talented personnel, and without an adequate supply of talented personnel the field is less likely to produce the impressive achievements that will raise its prestige. Until the environment of the educational R/D&I system becomes more favorable and more supportive of system functioning, personnel problems are likely to remain as critical barriers to significant achievement.

3. The Conduct of Research

Various other aspects of system functioning are affected by environmental influences -- by the nature of the field's knowledge and technology base, and by its omnipresent political and social vulnerability. As a field with a social science knowledge base, developed through study of humans rather than non-humans, the conduct of educational research and R/D&I must frequently face questions of values (e.g. what should be studied and how), ethics (e.g. how to safeguard the rights of those studied), and reliability (e.g. how to insure that findings are not unduly influenced by biasing factors). These questions are far more intrusive and problematic in social science fields than in areas of knowledge based on the natural sciences and on the study of inanimate or animate but non-human subjects.

The values and ethics issues are fairly obvious, and have produced various legislative and administrative safeguards to protect research subjects against unwarranted intrusions on their physical or emotional well-being, their privacy, or their time. Consequently, in the conduct of their work, researchers have to comply with often cumbersome forms clearance procedures and attendant delays in beginning data collection; they have to insure subjects of the confidentiality of their responses and indicate to them that they are not required to provide certain kinds of information unless they so choose; they must provide descriptions of planned measures to protect the confidentiality of responses; they must be prepared to have certain research approaches or questionnaire or interview items or data management procedures rejected by clearance officials as unethical or unacceptable on privacy confidentiality time burden/etc. grounds.

The reliability issues are less obvious but even more troublesome because of the considerable amount of uncertainty they introduce into the research situation. Unlike rocks or molecules, the humans studied in social science-based research have and exercise free will. In answering questionnaire or interview items, they may lie, they may misinterpret questions, they may have different views on a given subject from day to day, their responses might be significantly affected by wording or by reactions to the interviewer asking a question, etc. And given the value-laden nature of what is generally studied in social-science-based research,[13] there is a greater likelihood than in the natural sciences for bias to creep in through the researcher's own predilections, or through the quality of the interaction between researcher and subject. Experimental designs calling for randomization or various kinds of rigorous controls are also less feasible with humans, especially in field settings as opposed to laboratory research. Consequently, the procedures for conducting research in social-science-based fields must constantly take reliability problems into account -- in the ways instruments are designed and administered; in such precautions as matching interviewers and subjects wherever possible by race, sex, age, background, etc.; in research designs; in data analysis techniques; in reporting conventions; etc.

4. Research Outputs and Length (and Costs) of R&D Cycles

Compared to the natural sciences, social science research tends to involve far more field research and proportionally much less laboratory research. Field research tends to be more complex than laboratory research: it generally involves many more variables and much less control. Therefore, it is generally much messier, its results are harder to replicate, and a quality, cumulative knowledge base develops slowly if at all.

The social science nature of the field's knowledge base, then, in and of itself inhibits the system's rapid development and complicates R/D&I functioning. And beyond that, the weakness of this particular social science knowledge base, the educational R/D&I knowledge and technology base, severly constrains the per-dollar payoff to be expected from investing in R/D&I in the education sector. The large gaps in the available knowledge base, and therefore the large number of unknowns in many research problems and the inadequacies of existing research technologies for filling many of those gaps make more difficult the transformations between R/D&I stages -- e.g. from research to design, from design to development, from development and testing to refinement, from product refinement to dissemination, acquisition, and implementation. Consequently, compared to R/D&I systems with well developed knowledge and technology bases, far more research is likely to be needed in education prior to or during the design and development stages, and more iterations of the development cycle are likely to be needed as more and more is learned from each field test about weaknesses in the product's design. Where more resources need to be allocated to the research and development phases prior to production and distribution, there is relatively less payoff per dollar invested in a given product.

5. Defining Research Problems and Planning Research Strategies

The weakness of the field's knowledge and technology base, therefore, may discourage investment in educational R/D&I program or product development as too costly for the potential benefits to be expected. This weakness also makes it more difficult for researchers or R&D personnel to define a research or development problem and plan how to attack it. There has been some discussion in the literature of how inadequately educational researchers define research problems -- how little grasp educational researchers seem to have of what a research problem is, or how to define it in a way that makes it researchable given the existing knowledge and technology base. Educational researchers tend to confuse the significance of a problem topic with the research problem itself; or frequently they confuse the research problem with their objectives or the steps they intend to follow. The importance of being able to define researchable problems cannot be overrated as a prerequisite to engineering a solution. By analogy to a hypothetical aerospace situation, once the problem is defined in terms of ten specific questions to be answered, the problem can be solved and the rocket will be launched, or the failure of an operating system will be corrected. In education, however, researchers are unable to specify the questions to be answered in so rigorous a manner, partly because there are so many unknowns and partly because educational researchers are rarely well trained in defining research problems in relation to knowns and unknowns in the field's knowledge and technology base.

6. Social and Political Vulnerability

We need not belabor the point further. The nature and weakness of the field's knowledge and technology base are at the crux of many of the operating problems of the educational R/D&I system. Equally critical in explaining many of the system's operating problems is the field's social and political vulnerability to environmental influence. This vulnerability is evident, for instance, in how subject the system has been to political influence -- e.g.: in giving in to pressures for programs oriented to immediate results rather than long-term planning and more gradual development of solutions; in focusing resource allocations overwhelmingly on developing and implementing programs rather than on building the system's resources and capabilities; and in creating a large network of laboratories and centers across the country to satisfy regional political interests, rather than creating only a few institutions equal in number to the existing critical masses of talent in the field; etc. Had the field been able to resist these political influences and created a smaller educational R/D&I system, staffed by talented manpower; investing a considerable portion of available resources in capability-building activities, long-term planning, and long-range R&D work, more significant achievements might have been produced at a lower cost in dollars and in the system's already inadequate reserve of prestige.

This social and political vulnerability of the education sector is especially evident in user system acquisition decisionmaking, where we see the behavior of operating system personnel in seeking out, accepting, or rejecting externally developed innovations influenced as much by externally defined needs and perceptions of community sensitivities as by the inherent merits of a particular product or program.

The system's vulnerability is also apparent from the legitimacy and credibility problems frequently encountered by educational R/D&I personnel. Rather than seeing educational researchers or R&D personnel as working for their benefit, members of the black community, for instance, have come to be suspicious of the numerous studies and projects conducted by white researchers in the black community, presumably for the benefit of the black community. The argument has been made frequently that black residents give generously of their time and insights, white researchers publish their studies to the benefit of their careers, and then they go on to other work, leaving the black community in no better position than before. As a consequence, black residents or leaders in some communities have refused to cooperate with white researchers, or have demanded to be paid for their time and assistance as a precondition for participation.

7. Lack of a Strong Constituency of Powerful Agency Advocate

But perhaps the most serious difficulty resulting from the system's prestige, legitimacy, and credibility problems is its inability to develop a substantial constituency of its own, to function as a counterweight to those environmental influences that weaken system effectiveness. Neither the research community in general nor the educational research and R/D&I community in particular has been vocal or active in generating support for educational R/D&I or blunting the positions argued by the system's detractors and opponents. Despite AERA discussions about the need for the field to gain more influence over its agenda and directions[14], little has been done to structure the field in a manner that could bring about this goal. So the field remains buffeted by external forces -- agendas remain determined largely by Federal agency officials influenced by advisors they select, and by social and political forces too powerful to resist or dilute. AERA has in the past couple of years tried to organize some political liaison groups of its members who volunteer essentially to lobby on behalf of the interests of the educational research community as they perceive these interests. As yet, however, it is too early to note any discernible influence from this lobbying.[15]

Richard Dershimer, in his history of federal involvement in educational R&D in the '60s and early '70s,[16] has argued that traditional notions of political constituencies as powerful influences on what happens in Washington are mistaken when one looks at such areas as educational R&D. Instead, he argues, relatively small numbers of agency bureaucrats committed to certain programs or goals are generally the determining influences on what policies are put into effect (or at least were in the 1960s) even when no political constituencies "out there" express any interest or exert any pressure. That may in fact be a valid picture of the Washington reality. But if so, it simply underscores how weak the leadership from NIE has been, or OE between say 1968 and 1972, in behalf of the interests of the educational research and R&D communities.

In addition to the lack of a strong research/R&D community constituency or powerful agency advocates for educational R/D&I, school personnel have tended to show relatively little interest in most of the outputs of external R/D&I. Consequently, there is limited demand for system outputs, marketing problems are enormous, and the political clout that could be mustered by numerous education interest groups is not exercised in behalf of the R/D&I system.

8. Summary

In all, then, environmental influences on educational R/D&I are enormous, and must be taken into account as serious constraints on the feasibility of options and strategies that might be considered for managing and enhancing the functioning of this R/D&I system. Given the low prestige, legitimacy, and credibility of the field, the general lack of confidence in its ability to achieve anything significant, and the lack of any substantial constituency to assert the system's interests, it may be difficult to muster significant support for policy options or management strategies that require expanded resources, or that significantly shift resource allocations from direct program and product development categories to system capability-building activities.

Given the vicious circle of interrelationships between low prestige and limited attractiveness to first-rate minds, personnel problems may remain critical barriers to significant achievement unless specific plans for overcoming this weakness are included in whatever policies or management strategies are developed.

Given the extreme vulnerability of the system to social and political influence, the feasibility of particular KP or KU options will always have to be assessed in relation to social and political forces, those likely to support and those likely to oppose a specific proposed action. And too, strategies involving the design of particular innovations and the manner in which they are disseminated or marketed need to take possible sources of opposition or difficulty into account and plan accordingly.

Strategy development must consider such environmental influences as the nature of educational innovations, the nature of the educational knowledge and technology base, the current underdeveloped state of that knowledge and technology base, and the governance structure of the education sector, posing all the various kinds of problems we have noted throughout this chapter -- the difficulties in gaining widespread user system acceptance and adoption and in achieving effective implementation of educational innovations; the values, ethics, and reliability issues inherent in social science knowledge bases; the large number of unknowns in the educational R/D&I knowledge and technology base, and the problems this poses in defining research problems and in requiring substantially larger research and development costs and therefore proportionally less per dollar payoff in funds invested in educational R/D&I activities; etc.

Effective policy formation and strategy development must take these environmental constraints into account so as to minimize or overcome their influence. But beyond this, is there anything system managers can do to directly influence the environment to make it more supportive of educational R/D&I? Clearly, some of the environmental factors we have considered must be viewed as fixed and, for all practical purposes, unchangeable (e.g.: the nature of the knowledge base of the field, the nature of educational innovations, and the governance structure of the education sector). But other environmental factors would seem to be amenable to various types of policy interventions that might conceivably improve the environment of educational R/D&I, to make it more favorable to system interests and needs. We conclude our analysis of environmental influences on educational R/D&I by considering the interrelated web of influences on environment-system boundary transactions, the degree to which each influence must be considered fixed or amenable to change, possible policy interventions to improve the system's environment, and what more we need to know before we can develop these policy ideas into workable strategies for improving the system's environment and therefore the flow of inputs and supports that are likely to enhance system functioning or at least minimize difficulties in system functioning.

III. DESIGN OF POLICY INTERVENTIONS

1. Conceptual Framework

Political systems analysts conceptualize the relationship between systems and their environments in the manner shown in Figure 1.[17] In political terms, the key inputs flowing from environment to system are demands made on the system and supports (positive or negative) for the system; outputs flowing from the system (in the form of decisions, policies, or actions, or in the case of R/D&I, programs, products, strategies and the like) are a major factor affecting those demands and supports. When a system is functioning in relative equilibrium with its environment, system outputs are meeting or even exceeding environmental demands, and therefore the system is accorded legitimacy and other kinds of supports that insure an adequate flow of inputs to meet system needs; the demands remain moderate in number and intensity, and are processed without undue strain on the system. However, when as in the case of education, system outputs are not able to meet or keep pace with environmental demands in number or in quality, and for this reason and others supports for the system are low, the flow of requisite imputs (e.g.: funding, manpower, and other resources) is likely to be inadequate to system needs, and the number and intensity of demands are likely to overwhelm the system's capacities for processing and dealing with them.

In Figure 2; we have expanded the political systems model to include all the various kinds of environmental influences we have considered in this chapter, their relationship to demands, supports, resource inputs, system functioning, and outputs, and their complex interrelationships. The sketch is designed to show how complex the interrelationships are in this web of environmental influences and system features, and therefore why it is so difficult to locate points of leverage around which to design policy interventions or management strategies that provide reasonable chances of improving the system's environment.

FIGURE 1

POLITICAL SYSTEMS MODEL

Environment

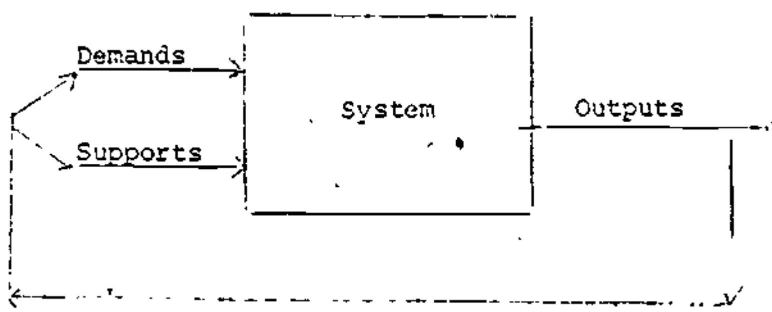
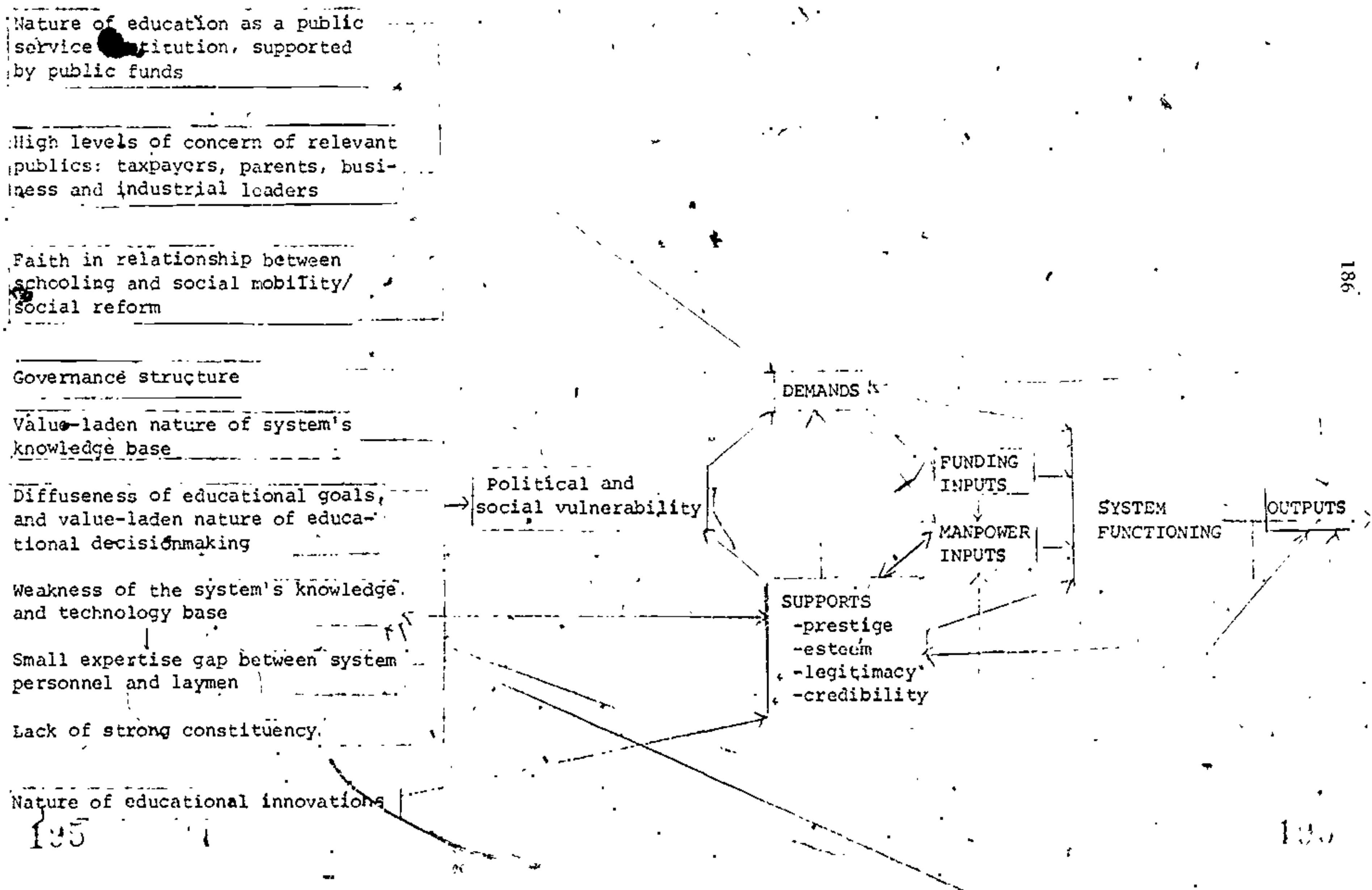


FIGURE 2

ENVIRONMENTAL INFLUENCES IN RELATION TO
DEMANDS, SUPPORTS, INPUTS, SYSTEM FUNCTIONING, AND OUTPUTS



Several points depicted in the sketch should be underscored before we attempt to use this framework to determine what the most fruitful points of leverage may be:

A. Demands

In the education sector, demands on the system are likely to be high -- because of the nature of the system as a public service agency, supported by public funds. It is a system affecting every taxpayer and especially every parent with school age children attending the public schools; and too, it is a system affecting the business and industrial community because of the relationship between schooling and labor pool qualifications.

Demands are also likely to be high because of the social and political vulnerability of the system -- due to the system's governance structure, the value-laden nature of the system's knowledge base and its decisionmaking, the weakness of the system's knowledge base and therefore the relatively small expertise gap between system personnel and laymen, the high level of concern about system functioning felt by relevant publics, and especially the strong faith Americans have placed in schooling as the primary vehicle for social mobility and social reform.

The operating system has developed a powerful constituency of its own and a vocal body of interest groups to lobby its case. The educational R/D&I system, however, lacks a significant constituency or a substantial lobbying mechanism.[1] Consequently, while many demands are made on the R/D&I system by external forces, few demands are articulated on behalf of the system -- either to assert its needs, or to serve as a counterweight to external forces able to intrude their perceptions and interests in the processes that affect decisions about R/D&I system inputs and functioning.

B. Supports

Supports for the R/D&I system are generally low, and this is attributable to a number of interrelated factors. First, the knowledge base is weak. Consequently, both the knowledge base and the system that applies it are low in prestige in the various research and R/D&I subcultures that could potentially be drawn on by the system. Second, with some notable exceptions, system outputs have not been outstanding in quality, reinforcing the system's low prestige in the scholarly and broad R/D&I communities and contributing to the generally low esteem in which external R&D is held by operating personnel and by members of Congress and others who critically influence resource allocation decisions. Third, the nature of educational R/D&I outputs as innovations focused primarily on "people change" contributes to the difficulties they face gaining acceptance in the operating system and then achieving effective implementation. Failure to achieve widespread adoption of R/D&I outputs, significant changes in school practices and programs, or substantial impact on student achievement (or other objectives of particular outputs) contribute to the low prestige of educational R/D&I and the relatively limited demand for its outputs.

C. Goals, Needs, etc.; Inputs; Functioning

We noted earlier how these various environmental influences affected the definition of R/D&I goals, needs, policies, and strategies; how they affected the flow of such critical inputs as funding and especially talented personnel into the system; and how they affected the conduct of various system functions. These paths of influence are also noted in Figure 2.

D. Interrelationships

Finally, several of the interrelationships depicted in Figure 2 have been considered previously. For instance, the weaknesses of the system's knowledge base contribute to its low prestige, both of which make it difficult for the system to attract the needed input of first-rate personnel, which in turn reinforces the system's low prestige, all of which combine to make it more difficult to strengthen the system's knowledge base or to produce outputs of outstanding quality, marketability, and feasibility for effective implementation and impressive impact. Or to take another example, the nature of education as an institution, its governance structure, the high level of concern of relevant publics, the weakness of the knowledge base and therefore the small expertise gap between educational personnel and laymen all create substantial vulnerability to environmental influence. This is reinforced by the weakness of system supports (due to all the factors we considered above). This vulnerability permits the system to be buffeted by demands articulated by groups in the system's environment, derived from perceptions of system outputs as inadequate or from social and political forces external to the system. In the absence of any countervailing system clout (e.g.: a substantial constituency and influential lobbying force of its own, prestigious spokesmen actively arguing its case, etc.), supports remain low, demands remain high, and inputs remain inadequate.

The criss-crossing of two-way arrows so prevalent in Figure 2 suggests that key variables are closely interrelated in a web of cause and effect. Given the complex interrelationships, where, if at all, are there points of leverage for policy interrelationship? System outputs, for instance, are both a <u>cause</u> of the existing pattern of demands and supports, and an <u>effect</u> of those demands and the low level of system supports as well as such other factors as the level and quality of funding and personnel, the nature and weakness of the knowledge and technology base, the nature of educational innovations, etc. The low level of system supports, to consider another example, is a <u>cause</u> of the low level of funding and the poor quality of personnel inputs flowing to the system and the resultant poor quality outputs, and in a sense a cause of the high level of demands made on the system -- if the system had more prestige it would be less subject to external demands. Indirectly, the low level of supports is also a cause of the continuing weak status of the field's knowledge and technology base -- if the system had more prestige, it would be better able to attract the first rate talent that might bring about significant gains in the knowledge and technology base. The low level of support is also an effect -- of the poor quality outputs, the nature and weakness of the field's knowledge base, the quality of the personnel pool, etc.

E. Fixed Factors and Factors Amenable to Change

Is it possible, then, to intervene in this interrelated web of influences? Which of these factors must be accepted as fixed for all practical purposes? Which, if any, might be amenable to change, in some fashion, to some significant degree? And which of these are likely to have the greatest short-term and long-term impact on system-environment relations?

The list of fixed influences must include: the nature of education as an institution, its governance structure, the high level of concern of relevant publics, the social-science-based nature of its knowledge base, and the nature of educational innovations. More amenable to change might be such factors as: the level of system supports, the pattern of demands made on the system, the quality of the system's manpower pool, the weakness of the system's knowledge base, and the quality of system outputs. In the remainder of this chapter, we consider possible policy interventions that might be designed around each of these points of leverage, the problems inherent in each because of the interrelationship of factors depicted in Figure 2, and what more we need to know about all this.

2. Points of Leverage for Policy Interventions

A. Quality of System Outputs

Since the poor quality of system outputs is at the root of many of the system's problems with its environment, it seems reasonable to begin our analysis with this critical factor. Clearly, however, any attempt to improve the quality of system outputs is complicated by the interrelationship of this factor with others in the model -- the weakness of the field's knowledge and technology base, the generally unspectacular quality of the system's personnel pool and the low esteem in which the system and its knowledge base are held, making it more difficult to attract first-rate talent.

Despite these difficulties, several kind of policy initiatives might be attempted and studied for their effects. First and foremost, it would seem essential to increase the visible return on the investment that has been made in educational R&D. What would seem to be required is a substantially higher success rate, i.e., a larger proportion of funded projects producing visible successes and a much smaller percentage producing dismal failures. What this might require is a callous winnowing of research in progress or programs on the drawing boards, so that the overwhelming bulk of funding goes to low-risk research and R&D programs, defined as low-risk not necessarily because of their established, conventional nature but rather because there is already a substantial, high-quality knowledge and technology base accumulated to support such work, an impressive critical mass of talent working in the area, a significant track record of important achievements, and strong promise that major accomplishments are within reach.

A strong case might be made against an approach of this kind. For instance, it might be argued that a focus on low-risk research has a quality of deja-vu about it, returning us to the mid-'60s mistaken emphasis on quick pay-off projects that in fact turned out to be poor in conception and execution, and poor in the resultant quality of the outputs produced. However, this argument misconstrues what we have suggested, for we defined these research and R&D programs as being low in risk because of the high quality of their knowledge and technology base, the available critical masses of talent, and the strong record of achievement in the particular research area.

There is more validity to other arguments that might be made against this proposal. For instance, it cannot be denied that such a policy would probably cut off support for some areas of work in which a significant investment had already been made, and would jeopardize the futures of infant research areas and young and perhaps talented researchers. And too, such a policy would once again introduce an element of instability into educational R/D&I: once again long-term projects would have been cut off before they could bear fruit. Also, it cannot be denied that some of the most important breakthroughs that, historically, have changed our lives, have come from work done in what were once new research areas, while the work being done on the mainstream was only "more of the same" in the conventional mold, eventually to be made obsolete by what came out of the once infant research areas.

All of this is true. Still, unless R/D&I managers can begin to demonstrate that the overwhelming majority of funded programs are producing impressive gains, it will not be possible to improve the system's prestige, legitimacy, credibility, or level of support. And without such an improved support climate, it seems unlikely that the system will be able to attract the level and quality of funding and personnel inputs needed for long-term survival and maturation.

The design and implementation of such a policy will not be easy. Who is to decide which programs offer the greatest promise of impressive achievement? Who is to decide where the field's knowledge and technology bases are best developed and where the critical masses of talent are and are not working? Who is to attempt to develop consensus in the field on what constitutes "impressive achievement" (impressive to whom, on what grounds)? And who is to develop the field's acceptance of the fact that it may be important to the field's long-term interests to sacrifice some present support for work in areas that might prove to have fundamental significance but that have not yet developed a substantial enough knowledge and technology base and personnel pool to suggest that significant achievement is within reach? How can system managers answer the argument that if support for these areas is sacrificed now they will never be able to develop that knowledge and technology base or the critical mass of talent viewed as a prerequisite to support? Can system managers find a body of eminent advisers from the field, who are reasonably free of bias (or whose unavoidable biases cancel each other out), and whose judgements will be viewed as having legitimacy, even by those individuals and/or organizations whose interests are hurt? What role, in this process, if any, might be played by such professional associations as the AERA, APA, ASA, APSA, etc.?

A second sort of initiative might be considered that takes into account part of the argument made against what we have just suggested. There is a great deal of validity to the argument that work of fundamental long-term significance is likely to come out of some of these infant research areas, and that if support for this research is cut off now these research areas may be prevented from developing the requisite knowledge and technology bases and critical masses of talent. Therefore, a portion of the available resources might be set aside to support work these areas. But if this is done, it becomes important to make clear to laymen, practitioners, Congress, and other potential critics just what such funds are and are not expected to produce, and especially make clear over what (long-term) time periods pay-offs of any kind can be even hoped for, what the likelihood of pay-off may be, and why the investment is considered a wise one despite the long wait and the uncertainties of a significant return.

If a policy of this kind is pursued, it will require (as did the first initiative we considered) involvement of eminent leaders of relevant fields to help determine which research areas (of the large number that might be supported) seem to offer the strongest possibilities of ultimately producing significant achievement. However, if recent experience is any indication of what might be expected in the future, committees of eminent scholars are reluctant to make such choices among research areas, even when specifically asked to do so, leaving the choice to others (such as agency staffers) who are probably less qualified than themselves to make such choices.[18]

A third policy initiative that might be considered would involve a direct campaign to use those impressive system outputs that do exist (or are produced over time) to improve the image and therefore the level of supports for the system in various research and R&D communities inside and outside the educational R/D&I system, among operating system personnel and decisionmakers, among members of Congress and the federal agencies influential in resource allocation decisions, and among laymen in general. Such a balatant public relations campaign probably could not justifiably use public funds. But it would seem appropriate to an educational research/R&D interest group such as the AERA, especially if it were conceived in part as an effort to educate these various constitutencies in the complexities, difficulties, and problems in educational R/&I and the efforts being made by the field to overcome its problems and improve its performance.

A campaign of this kind might describe some of the outstanding achievements produced by the system, what they were, what their effects have been, and why it was possible to produce them -- how much money it took, what kinds of personnel, what sorts of settings and organizational arrangements, what existing knowledge and technology, how long it took to produce pre-existing knowledge and technology and the R/D&I output itself, etc.; how this compares to other areas where significant achievement may be within reach, what these future outputs might look like, what kinds of effects they might have, and what more may be needed to bring these to fruition -- how much more money and time, what kinds of personnel who may not yet exist in sufficient numbers or with the requisite skills, what kinds of knowledge and technology that may still need to be developed, etc.

Although the AERA would seem to be the most appropriate group to conduct such a campaign, there seems little reason to believe that this organization would have much enthusiasm for such a program. Although an effort has been made to describe the organization as representing both educational researchers and R&D personnel, it clearly remains oriented primarily toward educational research: Is it likely that the AERA would involve itself in such a campaign? Could it be persuaded to conduct such a campaign? If not the AERA, who might carry out this kind of initiative? Would any of the private foundations support such an effort and pay for the production of descriptive materials? If such printed matter did become available, would a group such as AERA's Governmental and Professional Liaison group take the campaign to Congress and other key decisionmakers? Clearly, as badly needed as such a campaign may be, there is likely to be some resistance (even within the field) to its advisability or appropriateness.

B. Weaknesses of the System's Knowledge and Technology Base

The vicious circle of influences that block further system maturation become particularly salient when one considers the need to strengthen the field's knowledge/technology base. As long as the knowledge and technology base of the system remains weak and inadequate to the needs of research and development activities, system outputs will remain poor in quality, and all the attendant problems of low esteen and difficulty in attracting first-rate talent will continue. But it seems unlikely that the knowledge and technology base of the field can be significantly strengthened unless some effort is made to attract a larger supply of first-rate talent to the field. And as long as the field continues to be held in such low esteem, the possibilities of attracting this high calibre talent in sizeable numbers seem remote. Equally significant, as long as support for the system remains low, it will be difficult to persuade those who control resource allocation decisions that a substantial proportion of available funds should be concentrated on knowledge-building activities that provide the slimmest and most long-term prospects for a tangible return on R/D&I investment. If this unhappy situation is to be reversed, talented researchers who might be attracted to the field and decisionmakers who control resource allocations, will have to be persuaded that a significant strengthening of the field's knowledge and technology base is possible within a reasonable time frame.

In preparation for a concerted effort of this kind, it would seem essential to bring together a body of eminent, respected scholars and R&D experts to map the knowledge and technology base of the field and assess the state of development of various research areas within that base. This effort might be even more useful if it was carried out in relation to another effort oriented toward identifying the kinds of outputs that are most badly needed by the field. This latter agenda might be drawn up by an equally prestigious panel of practitioners and agency officials. The two groups, first studying each other's findings and then meeting together, might come up with an agenda of priority work -- research areas that should be given priority attention, either because of their importance as a basis for developing needed outputs or understandings, or because work in the area is moving in the direction of making possible outputs or ways of thinking about education that could be of fundamental signficance, or both. We already alluded to this type of strategy (and its difficulties) when we considered options to raise the quality of system outputs. But it would certainly seem to be worth a try, especially if the priority research areas selected could be analyzed in terms of an agenda of researchable problems needed to make initial progress in extending the existing knowledge/technology base of each area from where it is now. If such analyses could be conducted, if adequate consensus could be developed in the field on the elements in this research agenda, and if talented researchers inside and outside the educational R/D&I system and those who control resource allocation decisions could be persuaded that a research agenda so structured and supported made significant future achievements seem highly likely, then substantial progress might be made toward strengthening the knowledge and technology base and enhancing the prestige of the field. Or a simpler, less direct strategy might be tried -- e.g.: simply attracting a critical mass of first-rate talent in a given area of the knowledge and technology base in need of development, providing them with the resources they require, and letting them determine the course of research to be followed and the manner in which this more basic work might be drawn on to develop applications for schools and classrooms. However, this latter strategy is easier to describe in the abstract than with any substantial degree of specificity, and it is no doubt likely to be easier to specify than to implement effectively, as we shall see below.

C. Quality of the System's Personnel Pool

The failure of educational R/D&I to attract a sizeable number of eminent researchers has been one of the most frequently repeated criticisms of the system since initial disappointment set in only a few years after it was created. But, as we note at several points in our analysis, from the very outset environmental influences discouraged whatever serious interest in educational research and R?D&I activities first-rate talent might have had. The field has long been held in low esteem by the various research and R&D subcultures from which potential personnel might have been drawn. And the unstable, vulnerable history of the institutionalized system, and its limited achievements, have only reinforced those long-held, deeply-rooted prejudices in the socialization patterns experienced by virtually all recruits to the worlds of academia and industrial R&D. As long as the firld continues to be held in low esteen, it is difficult for it to attract first-rate talent; and as long as there are relatively few eminent men and women and an inadequate supply of high calibre personnel in the field, its achievements will remain severely limited, and its prestige will continue on a low level. How, if at all, can we intervene in this vicious circle?

Some have concluded that impressive achievements must come first.[19] If this is true, then perhaps the strategies we discussed above for producing a few outstanding achievements offer the best long-term possibilities of attracting first-rate talent to the field. System managers might concentrate resources where critical masses of talent already exist. This might increase the number of impressive achievements to which the field could point and boost its success/failure ratio. Over time, talented students and established researchers from other fields might begin to see attractive possibilities for their work within educational R/D&I.

But are more rapid, more direct approaches possible? Some have been tried. For instance, one substantial funding program succeeded in attracting a significant number of young researchers from the disciplines.[20] But it is not clear at this time just how many, if any, of these researchers used the funds to conduct studies they would not have otherwise conducted within their disciplines, or just how many of them continued working on problems relevant to education after these grants ran out. To take another example, NIE conducted some invitational conferences to have eminent researchers from specific disciplines develop research agendas for the Institute, and, it was hoped, to stimulate their interest in applying for grants to conduct pieces of the research agenda they helped formulate.[21] However, we have seen little evidence of substantial results from this approach either.

Other kinds of recruiting strategies might be tried on a more one-to-one, personal but organzized basis. For instence, proposals might be solicited from first-rate researchers and R/D&I personnel in the field, with NIE offering substantial five-year research grants to those who develop the best proposals for: (a) developing specific outputs, or critical elements of the knowledge and technology base of particular priority areas, and (b) doing this by recruiting and working with critical masses of relevant talent from other fields, or even better, a mixed group of established researchers and a number of their young students or colleagues.

A second strategy might ential working with the professional associations (e.g.: AERA divisions or units working with the APA, ASA, APSA, and otherassociations tied to the disciplines or applied fields) to improve the image of educational research and R/D&I, its areas of past accomplishments and the possibilities for future achievement in specific areas, and to increase opportunities for talented researchers from these other fields to get interested in working on educational research and R/D&I problems. Of course, unless substantial progress is made in the coming years, it seems unlikely that any of these direct types of recruiting strategies will have much success in offsetting the pervasive notion that educational R/D&I is a hopeless enterprise, a field with too many risks and too few reasonable opportunities for significant achievement to be seriously considered as a career option for a researcher with real talent.

The policy options need to be considered thoughtfully, for the choices seem to reflect the old chicken-and-egg dilemma. Which must come first? Impressive achievements now so that capability building becomes more possible in the future? Or, capability building now so that impressive achievements become more possible in the future? Or, as we have suggested elsewhere,[22] is it possible to structure procurements in such a way that both objectives can be achieved at the same time? We shall return to this point in other chapters.[23]

D. Level of System Supports

The level of supports for educational R/D&I might conceivably be raided by direct or by indirect intervention strategies. Strategies that might indirectly raise the level of system supports would be those focused not so much on supports themselves as on some of the root causes of the low esteem in which the system is held. What we have in mind here are those strategies considered above, designed to produce outputs of impressive quality, to strenthen the field's knowledge and technology base, and to attract more first-rate research and R/D&I talent to the field.

More direct support-building strategies might be tried as well. The kind of public relations campaign we considered earlier could be part of one such strategy, especially it it is carried out through an approach that communicates not only the impressive accomplishments the field has already achieved but also the problems faced by educational R/D&I and the efforts being made by the field to overcome these difficulties and improve its performance. A campaign of this kind might be particularly effective in building support for the system if it also conveyed messages about potential future benefits that might accrue to each target audience from the improvement of system functioning, and what each group might do to contribute to that goal.

But such future benefits to be conveyed must be derived from the realities of group interests and of what gains can legitimately be expected under various more or less possible conditions. Therefore, designers of this strategy will need much more specific information than is available now about the perceptions, expectations, and desires of each of these target audiences (especially groups and individuals who have not thought of their interests in relation to educational R/D&I, such as researchers and R/D&I personnel from other disciplines and sectors). Once such information is available and is used effectively by professionals with constitutency-building talents, it may be possible with the right mix of prestigious researchers and R/D&I personnel from the education sector and adequate organizing resources to develop a direct constituency-building campaign tragetted at diverse audiences who can be persuaded that their interests can be served by, or linked to, a strong, effective educational R/D&I system. Target audiences might include researchers and R/D&I personnel from the education sector and from other disciplines and sectors; private sector firms who might eventually produce, market, and/or distribute the outputs of educational KP activities; school personnel and decisionmakers; members of Congress and other federal agencies who affect resource allocation decisions; parents and layment generally.

How might such a direct constituency-building campaign be conducted? By whom? Using what resources? How much voluntarism could be relied on? How much of the work and coordination would have to be carried out by full-time, paid professionals? What roles might be played by the professional associations? What legitimate arguments would be most persuasive for building support in each segment of the potential constituency? Assuming the constituency-building effort is successful, how and for what purposes might each segment of the potential constituency be called on in the future to meet the system's needs for lobbying its case, for locating and recruiting particular kinds of expertise, information, etc.? If resources are to be invested in such an effort, tentative answers to all these questions must be formulated, based for the most part, we would hope, on research data and on the judgments of professionals skilled in such campaigns.

E. Pattern of Demands Made on the System

Given the various environmental influences which create extreme system vulnerability to social and political demands, it seems unlikely that the system could ever become immune to external pressures, even if this were desirable. As long as system supports remain weak, and as long as the system continues to be held in low esteem (because of the weaknesses of its outputs, its knowledge and technology base, and its personnel pool), external demands made on the system will remain high and perhaps dominant in determining system directions and patterns of functioning. However, some policy initiatives might be effective in reducing the number and intensity of such demands, and in achieving greater balance between demands for system-generated needs, on the one hand, and environment- generated needs, on the other.

Although demands and supports can be somewhat independent variables it seems reasonable to assume that the higher the level of supports for a system and the greater the legitimacy and prestige it is accorded, the less intrusive external forces are likely to be in attempting to influence the directions of system functioning ~~and the~~ types of system outputs to be produced. Therefore, all the various strategies we have considered to directly or indirectly affect the level of system supports are likely to have some indirect effect on the pattern of demands made on the system as well.

Direct strategies to affect the demand pattern also seem possible. For instance, the constituency-building activities directed at particular audiences might include all those sources of major demands made on the system. Particular strategies might be designed to persudade each target group not only of its stake in the development of an effective educational R/D&I system, but also which of its demands are reasonable or unreasonable given the existing state of development of system capabilities. If these groups could be persuaded that demands beyond the system's capabilities now might be met in the future if the system had more resources, or if the system were permitted to pursue particular capability-building programs in the areas of personnel development or more basic research (i.e., filling in some of the gaps in the field's knowledge and technology base), then greater balance might be achieved between environment-generated and system-generated demands, to the ultimate benefit of both the system and its constituency.

IV. NEXT STEPS

1. Where We Are Now

The field and its leadership seem to have a reasonably good understanding of the dilemmas posed by the unsupportive environment in which the educational R/D&I system functions. Although there is little that could be categorized as a literature specifically focused on environmental influences, there is a considerable amount of commentary on these influences, generally as part of discussions of other matters.

The difficulty is not lack of understanding of the nature of the problems, but rather, what to do about them, and perhaps too, a sense that there is probably very little that can be done about them directly.

It may be that nothing should be done about these problems directly. The survival crisis may be over, and these who were bitterly attacking educational R&D and calling for a zero budget for NIE in 1974 may simply be ignoring educational R?D&I as too insignificant a matter and too small a federal budget item to warrant their continued concern. Certainly, the climate in Congress is far less antagonistic than it was only a few years ago. And potential critics may simply ignore the enterprise long enough to permit the system to develop and mature over time and produce a more impressive record of achievements.

Still, even if the political climate is less antagonistic than it once was, this gain is not likely to improve the esteem in which the field is held by talented researchers in other fields. And clearly, attracting more talent to the field, and strenghtening the field's knowledge and technology base, must still be viewed as concerns warranting priority attention.

2. Needed Research and Analysis

Various kinds of data-gathering and analytical work might be carried out as the basis for designing the kinds of direct campaigns we have suggested here. If it was decided to limit such campaigns to lonly improving the view of the field held by researchers, only parts of what we are proposing might be undertaken. Or, if a broader series of campaigns were considered, targetted also at practitioners, at Congress, at federal agencies, etc., more of the suggested data-gathering might be included.

For instance, one possible line of inguiry might entail empirical surveys of members of the research and R/D&I communities (in the education sector and in other disciplines and sectors), school personnel, members of Congress and federal agencies that control resource allocation decisions, etc. to determine for each group:

-just how high or low in esteem they hold educational R/D&I, and the relative importance of various factors we have considered in explaining different levels of support;

-what indicators of improved system functioning, or potential for improved functioning, would persuade them that educational R/D&I is becoming more effective and should be viewed more favorably;

-what potential future gains they conceive might be derived from improved system functioning that could be of particular benefit to their interests or to goals thay feel committed to achieving or to seeing others achieve;

-what role(s), if any, each group perceives it could conceivably play in contributing to achievement of these goals;

-receptiveness to different arguments about

..impressive achievements educational R/D&I has made in the past,

..its potential for future improvement through focusing resource allocations on fewer outputs where significant achievement is judged by eminent leaders of the field to be within reach,

..its potential for future improvement through focused research on critical gaps in the field's knowledge and technology base, and

..its potential for future improvement through attracting first-rate personnel from other fields.

A second line of inquiry might entail empirical surveys of members of the educational research and R/D&I communities to determine:

-the extent to which the field accepts the fact that long-term system survival and maturation may be dependent on increasing the number and visibility of impressive achievements;

-how members of the field think this can be accomplished most effeciently;

-the extent to which the field accepts the position that for a time the overwhelming bulk of resources should be allocated to low-risk research and R&D programs, where there is already a substantial, high-quality knowledge and technology base accumulated, where there is already a critical mass of talent working, where there is already a significant track record of achievement, and where there appears to be considerable promise that major accomplishments are within reach;

-what allocation formula might be most reasonable for apportioning resources between low-risk work in areas of fundamental significance where breakthroughs will take longer and are less certain but may be of long range importance;

-which eminent members of the field they would nominate as most capable of judging which areas of research and R/D&I activity offer the greatest promise of impressive achievement, where the knowledge and technology base is best developed, and where critical masses of talent are already working;

-what past and present system accomplishments they would rate as impressive achievements that should be made more visible to potential constituencies;

-what areas of the knowledge and technology base they believe are best developed and offer the strongest base for producing impressive achievements that are within reach;

-what areas of the knowledge and technology base that are not yet well developed they believe to be in need of development to increase the likelihood of future breakthroughs of fundamental significance (and where there are already first-rate researchers or R/D&I personnel working in these areas);

-for each area of the knowledge and technology base the respondent described as a) in need of short-term of long-term strengthening, and as b) an area with which he has some familiarity, what eminent researchers or R/D&I personnel he would nominate as best able to develop an agenda of researchable problems that, once solved, could increase the possibility of future achievements of significance;

-which areas of research and R/D&I activity they believe already have critical masses of talent at work, and who they would include in this "critical mass" designation in each area of activity in which they have some expertise or familiarity; and

-what roles they believe should be played by the professional associations in making these choices and plans.

A third line of potentially useful inquiry might involve analyses of the key sources of external demands made on the educational R/D&I

system in the past three years, and the system's capabilities for meeting each set of demands given existing resources and capabilities, especially the state of development of relevant segments of the field's knowledge and technology base and personnel pool.

In a second stage of the data-gathering and analysis effort, eminent members of the educational research and R/D&I communities nominated by their colleagues in the previous surveys would be contacted to determine their willingness to participate in the planned program. Those who agreed to participate would then be surveyed for their judgments of the various items enumerated earlier (e.g.: which areas of research and R/D&I activity offer the greatest promise of impressive achievements that are within reach, where the knowledge and technology base is best developed, where critical masses of talent are already working, what past accomplishments are most impressive, what allocation formula should be used to apportion funding between low-risk programs where major accomplishments are within reach and higher-risk programs of fundamental significance where breakthroughs will take longer and be less certain, etc.). They would also be asked to identify those researchers and R/D&I personnel they would include in the "critical mass" designation in each area of activity they selected as (a) providing promise of impressive achievements within reach, or as (b) in need of long-term capability-building development of the perso-nel pool and relevant knowledge and technology base if breakthroughs of fundamental significance are to be achieved in the future.

3. Strategy Design and Monitoring

Based on the assembled information and judgments, it might be possible to design several specific kinds of strategies, such as:

a) campaigns targetted at potential constituences to

- publicize impressive system outputs;

- educate these various constituences in the complexities and difficulties in educational R/D&I, and the efforts being made by the field to overcome these problems and improve its performance;

- develop understanding of what more is needed before specific future system future system breakthroughs of significance are likely to be produced; and

- generate support in each constituency and willingness to help the system get what it needs to bring about these future breakthroughs;

b) funding programs to support the staged agendas of researchable programs developed by the Institute's panel of eminent researchers in each segment of the knowledge and technology base determined to be a high priority area of development, to speed the achievement of significant breakthroughs that are within reach and others that are of fundamental significance but are riskier and will require longer-term commitments; and

c) funding programs to attract critical masses of talent in given areas of the knowledge and technology base in need of development.

To determine how effective such strategies had been, it would seem important to be able to monitor impact, if even in the roughest of ways, e.g.: in terms of judgments of knowledgeables about what effects each strategy has had on a number of dimensions:

- quality of system outputs, and their impact on the operating system, and especially on students;

- speed with which they are produced, relative to rates of development of comparable outputs in the past;

- gains in the system's knowledge and technology base in particular areas;

- gains in the attraction and development of a high calibre personnel pool in given areas of research and R/D&I activity;

- effects on the level of supports accorded the system by each potential constituency;

- effects on the pattern of demands made on the system;

- effects on funding levels; and

- effects on the conduct of various R/D&I system functions and such other comparative system features as institutional configuration, information flow, and research on the R/D&I system.

There is, of course, no precise way to measure such dimensions. Nor, in the absence of measurement or baseline information or controls, is there any way to attribute judged gains on one or another of these dimensions to a particular strategy that might have been implemented. Still, if we could get even these rough judgments from knowledgeable observers, we would probably be in a significantly stronger position than we are now to improve environmental influences on the educational R/D&I system.

V. CONCLUSIONS

We have focused in this chapter on how the environment of the educational R/D&I system acts as a constraining influence, impairing system functioning directly, and also indirectly by making it more difficult to acquire the quantity and quality of funding and personnel inputs needed for high level system functioning.

To improve the system's environment, it seems necessary to improve the system's image. But such image building seems offensive to many (even many who could gain from it). It may seem offensive because public relations campaigns tend to be viewed as self-serving lying (or at the very least, exaggeration). Or, it may be that researchers and R&D personnel feel that their time should be devoted to their work, and that if their work is of sufficient quality the "public relations" will take care of itself.

Regardless, the options are either to: (a) do nothing, and hope that over time the quality of outputs will improve sufficiently so that the public relations will take care of itself; or (b) invest heavily in capacity-building work and in the projects likely to produce quality outputs in the near term (so that in time the public relations will take care of itself); or (c) to try to intervene directly in improving the system's environment, so that it will be easier to attract the needed quantity and quality of inputs to raise the quality of outputs (so that in time the public relations will take care of itself); or (d) some combination of these possibilities.

At the very least, it would seem important for some consideration of these options and some clear thinking on which of these courses is to be followed, so that one way or the other in the future, the system's environment will be less powerful a constraint on educational R/D&I functioning.

FOOTNOTES

1. The "vulnerability" concept comes from the discussion in Sam D. Sieber, "Organizational Influences on Innovative Roles," in Knowledge Production and Utilization in Educational Administration, T. Eidell and J. M. Kitchel, eds. (Eugene, Oregon: Center for the Advanced Study of Educational Administration, 1968).

2. For instance, see the differences in ratings and responses offered by parents of school-age children and others in the annual Gallup polls of education: George Gallup, How the Nation Views the Public Schools of the United States (Princeton: Gallup International, 1969); George Gallup "Second Annual Survey of the Public's Attitude Toward the Public Schools," Phi Delta Kappan, 52, October 1970; and subsequent publications of the survey results each year in the September issue of Phi Delta Kappan.

3. Colin Greer, The Great School Legend: A revisionist Interpretation of American Public Education (New York: Basic Books, 1972).

4. James S. Coleman, Ernest Q. Campbell, Carol J. Hobson, James McPartland, Alexander M. Mood, Frederic D. Weinfeld, and Robert L. York, Equality of Educational Opportunity (Washington: U.S. Government Printing Office, 1966); Christopher Jencks, Marshall Smith, Henry Acland, Mary Jo Bane, David Cohen, Herbert Gintis, Barbara Heyns, and Stephan Michelson, Inequality: A reassessment of the Effect of Family and Schooling in America (New York: Basic Books, 1972).

5. Committee for Economic Development, Innovation in Education: New Directions for the American School (New York: CED, 1968); and Committee for Economic Development, The Schools and the Challenge of Innovation (New York: McGraw Hill, 1969).

6. For instance, see the Gallup polls cited above in footnote 2; also, Paul F. Kleine, Raphael O. Nystrand, and Edwin M. Bridges, "Citizen Views of Big City Schools," Theory into Practice, 8, October 1969, pp. 223-228; Louis Harris and Associates, A Study of the Attitudes of Parents in New York City and in Selected New York Suburbs Toward Their School Systems (New York, Center for Urban Education, 1969); Basil Zimmer and Amos H. Hawley, Metropolitan Area Schools (Beverly Hills: Sage Publications, 1968); John R. Hoyle and Eldon L. Wiley, "What Are the People Telling Us?" Phi Delta Kappan, 53, September 1971, pp. 449-50.

7. For instance, see: Daniel P. Moynihan, "The Professors and the Poor," in On Understanding Poverty: Perspective from the Social Sciences, Daniel P. Moynihan, ed. (New York: Basic Boosk, 1968).

8. For instance, see: Benjamin S. Bloom, "Twenty-Five Years of Educational Research," American Educational Research Journal, 1966, No. 3; also, Benjamin Bloom in USOE-Funded Research and Development Centers: An Assessment (full volume of Journal of Research and Development in Education, Vol. 1, No. 4, Summer 1968).

9. Ronald Lippitt, "The Use of Social Research to Improve Social Practice," American Journal of Orthopsychiatry, Vol 35, July 1965, as reprinted in The Oregon Studies in Educational Research, Development, Diffusion, and Evaluation, Volume II: The Literature of Educational RDD & E, Bette C. Porter, ed. (Monmouth, Oregon: Teaching Research, Oregon State System of Higher Education, 1972).

10. Seymour B. Sarason, The Culture of the School and the Problem of Change (Boston: Allyn and Bacon, 1971).

11. Richard A. Dershimer and Laurence Iannaccone, "Social and Political Influences on Educational Research," Second Handbook of Research on Teaching, Robert M. W. Travers, ed. (Chicago: Rand McNally, 1973); and R. Corwin and M. Seider, "Patterns of Educational Research: Reflections of Some General Issues," in The Educational Research Community: Its Communication and Social Structure, R. Dershimer, ed., U.S. Office of Education report, Project No. 8-0751 (Washington: USOE, 1970).

12. For instance, the PSSC physics curriculum, the BSCS biolody curriculum, the CHEM chemistry curriculum, the new math curricula, and less successful variants in social science fields as well.

13. Hendrik Gideonse reflects this perspective in his various articles. For instance, see Hendrik D. Gideonse, Elements of National Science Policy: A Perspective from the Behavioral and Social Sciences. Paper submitted to the Subcommittee on Science, Research, and Development, Committee on Science and Astronautics, U.S. House of Representatives, as reprinted in The Oregon Studies, Vol. II, op. cit.

14. For instance, Richard Dershimer's pieces in R. Dershimer, ed., The Educational Research Community, op. cit.

15. Congress' relations with NIE have apparently improved beginning at about the same time as this AERA political liaison work. However, there is no evidence to suggest that the two developments are at all related.

16. Richard A. Dershimer, The Federal Government and Educational R&D (Lexington, Massachusetts: Lexington Books, 1976).

17. For instance, David Easton, A Systems Analysis of Political Life (New York: Wiley, 1965).

18. See Sara B. Keisler and Charles F. Turner, eds., Fundamental Research and The Process of Education: Final Report of the Committee on Fundamental Research Relevant to Education (Washington: National Academy of Sciences, Assembly of Behavioral and Social Sciences, National Research Council, 1977). Compare their description of what they were asked to do (see their preface) with the report they produced. For commentary on this gap between what they did and what they were asked to do, see our analysis: Michael Radnor, Durward Hofler, and Harriet Spivak, Strengthening Fundamental Research Relevant to Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

19. For instance, see: Marc Tucker, Mary Harahan, Berlin Kelly, Ward Mason, and Saul Yanofsky, Building Capacity for Renewal and Reform: An Initial Report on Knowledge Production and Utilization in Education (Washington: National Institute of Education, 1973), ERIC ED 087 095.

20. See: COBRE. Final Report of the Committee on Basic Research in Education (Washington: Division of Behavioral Sciences, National Academy of Sciences - National Research Council, 1972); John B. Carroll and Patrick Suppes, "The Committee on Basic Research in Education: A Four-Year Tryout of Basic Science Funding Procedures," Educational Researcher, Vol. 3, No. 2, February 1974; and Cameron Fincher, "COBRE and the Dilemmas of Basic Research in Education," Educational Researcher, Vol. 3, No. 2, February 1974.

21. For instance, see: Patricia E. Stivers, "Researchers at NIE: From Planning into Action," Educational Researcher, Vol. 3, No. 5, May 1974; National Institute of Education, Conference on Studies in Teaching, June 16-20, 1974, Conference Materials; also, the authors were among the participants in NIE's conference on developing a research agenda on the organizational behavior of schools, held at Pajaro Dunes in California, in August 1974.

22. Michael Radnor, Harriet Spivak, and Durward Hofler, with Earl C. Young, Agency-Field Relationships in the Educational R/D&I System: A Policy Analysis for the National Institute of Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1976).

23. For instance, see our subsequent chapter entitled "Educational R/D&I Goals, Policies, and Strategies: Macro-Level Issues."

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER THREE

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CHAPTER THREE

GOALS

CONTENTS

One critical feature for analyzing any R/D&I system is the set of goals that describe what the system is intended to achieve and the policies and strategies developed to achieve these goals. In the case of educational R/D&I, the analysis of goals, policies, and strategies is a difficult (some might say, impossible) task. There are at least two reasons for this.

One, is that education by its very nature is a field with somewhat amorphous goals that lack the clarity and ease of operationalization of many other fields.[1] Educational R/D&I tends to share this problem with the whole broader field of education.

Second, the educational R/D&I system in the United States is not an easily boundable entity made up of clearly identifiable units established and/or managed by a central goal-setting, policy making body (or even a coordinated interrelating set of goal-setting, policy making bodies). There is some disagreement in the field as to whether it is reasonable to even think of educational R/D&I in this country as a "system." An alternative conceptualization proposed by Guba and Clark is that of a "configuration" of co-equal institutions who are independent of one another, have no common conception of R/D&I goals, operate with little relationship to one another, and (for most of the institutions in the configuration) view R/D&I projects as subordinate in importance to other, more primary activities.[2] If the configurational perspective is accepted, then there is no "system" whose goals, policies, etc. can be analyzed and therefore little point in trying to abstract from the functioning of the different R/D&I institutions the goals, strategies, etc. of a "system" that is in reality only a fiction.

The other side of this debate is that there are substantial potential benefits to be derived from thinking of the educational R/D&I configuration in system terms and treating at least certain aspects of the configuration as though there was in fact a system. This is the position we have generally taken in other analyses that we have produced.[3] We will suggest some of the benefits we see in that approach here in this chapter.

We consider policy and strategy questions throughout the analyses in this volume. Other chapters deal with policy and strategy issues specific to individual R/D&I functions (research, development, etc.) or system features (the institutional base, personnel base, funding, information flow, etc.). In this chapter, we examine matters of policy and strategy on a macro level.

Our concern in this chapter is with some overriding issues to be considered in thinking about macro level goals, policies, and strategies. After taking note of the literature we have been able to locate on (or relevant to) these matters, we present a number of key issues and explore arguments that might be made for and against various options. We then take a broad overview of the history of educational R/D&I in this country over the past two decades or so and examine what has happened in relation to each of these issues and options. In the course of this overview we note some of the political and other environmental forces that impinge on the processes of goal-setting and policy formation for educational R/D&I. We next identify the issues that seem to us to define the current debate on system goals and strategies. We turn then to the kinds of data that may be needed to support priority determination, strategy development, and planning. We conclude by suggesting the need for consensus building mechanisms to lessen the sharp discontinuities that have marked the history of educational R/D&I over the past two decades.

I. OVERVIEW OF THE LITERATURE

We have been able to locate only a handful of discussions in either the published or ERIC-accessed literature relevant to a consideration of macro-level educational R/D&I goals, policies, and strategies.

There are some analyses of mission development or goal-setting and policy development at the level of individual institutions, agencies, or other R/D&I sponsors.[4] (Particularly useful here is the analysis of policy management contained in the 1969 status report, Educational Research and Development in the United States.[5])

And too, there are a few fascinating analyses of the political and other forces that were involved in policy formation for educational R/D&I in the '60s -- one piece on the Johnson administration's strategies for circumventing the federal bureaucracy, Congress, and education interest groups in developing education policy;[6] Bailey and Masher's classic study of the policy process surrounding the early history of the Elementary and Secondary Education Act;[7] and Dershimer's very important history of the development of federal R&D policy for education in the '60s.[8] A more recent analysis by Roald Campbell and a panel of consultants commissioned by NIE describes some of the elements in the context in which NIE must make policy -- organized interest groups, Congress, NIE staff, the National Council on Educational Research, and other parts of the executive branch.[9] A careful reading of these sources raises questions about the relative importance in the policy development process of executive branch bureaucrats, White House staffers, members of Congress and their aides, education interest groups, key "influentials," etc. Reading between the lines in these historical discussions can also be suggestive about some of the overriding macro level issues policy makers were confronting.

At best, though, these sources can be assessed as dealing with matters at the fringes of the matters of central interest to us here.

The literature that deals more directly with these issues is of four types:

1. assessments of the inadequacy of macro level goal definition and strategy development;

2. presentations of frameworks for educational R/D&I goal-setting and policy/strategy development which pinpoint (implicitly or explicitly) a number of key issues;

3. historical overviews suggestive of the different balances that have existed on several of these issues (by intent or by default) at different times over the past two decades; and

4. analyses that present somewhat different goals and/or strategies for educational R/D&I based on judgments that what has occurred up to that point has perhaps been misguided, based on faulty conceptions of the way educational R/D&I or improvement of practice take place now or could take place some time in the future.

1. Assessments of the Inadequacy of Macro Level Goal Definition and Strategy Development

Almost from the very beginning of federal policy intervention to establish an educational R/D&I system, the evaluative literature has identified one major area of weakness as inadequate goal definition and strategy development, poor communication of goals and strategies, and minimal (if any) effort toward achieving some consensus on goals and strategies. This was suggested most strongly, for instance, in one early critique by Stephen Bailey, who (among other important roles) had spent a year studying the operations of the Office of Education and also served as Chairman of the National Advisory Committee on Educational Laboratories.

> Very little coherent thinking of a strategic and tactical kind has emerged from the Federal Government about educational R&D priorities, about adequate and durable funding levels, about effective instruments for evaluation, dissemination, utilization, and coordination of results. This lack has been explained on the triple grounds of mandated speed in disbursing funds, lack of adequate staff, and the hoary notion that the Federal Government should leave the direction of education to the mercies of pluralistic and often-contentious centers of decentralized authority: state, local and university.[10]

The point was made particularly well in the documents produced as part of the 1969 OECD review of educational R&D in the United States (undertaken by the Organisation for Economic Cooperation and Development as one component of a broader assessment of educational R&D systems in a number of nations). One of the key conclusions of the OECD examiners was that inadequate definition of goals and objectives at the federal level was a central problem for educational R&D in this country. They took note of the decentralized nature of educational decision making in this country, but even so they asked, "How does one determine how to allocate resources without a specific statement of objectives and goals?"[11]

The critique was made in even stronger terms by the Program Planning and Evaluation staff of OE's Center for Educational Research and Development in their 1969 status report prepared for the OECD review. In their condluding chapter, for instance, they summarized one body of evidence as follows:

> Probably the most all-embracing conclusion that can be drawn from the data is that no overall strategy currently governs the support and growth of educational research and development in the United States. Strategy as used here refers to an overall design, mapped out in advance with a set of consistent and well-defined goals and objectives, and a matching set of procedures and methods either identified or capable of being identified to attain those ends .... This conclusion does not refer to individual programs or agencies which might be examined ... which have, within the parameters of their particular responsibilities, very carefully mapped out strategies and are systematically pursuing them. All that is being said here - but it is critically important - is that no overall strategy exists which links, or provides for the linkage, of the many different kinds of individual efforts which are currently being supported in the field of educational research and development.[12]

The following year, in another piece, Hendrik Gideonse, the then head of the OE unit which prepared this document, described the OECD review as having "firmly documented the absence of any <u>de jure</u> national research policy for education."[13]

Five years later, in 1975, expert observers were still pointing to the same problem. In the Campbell Report mentioned earlier, we are provided with the findings of a commissioned review of NIE's R&D funding policies by a panel of prestigious consultants. It is clear from this document that the panel took seriously the premise that NIE was established to be the lead agency for educational R&D. The group examined the agency's strategic thinking and program planning and design processes in terms of the lead agency conception. Some positive points along these lines were noted -- for instance: "Serious strategic thinking (was) done in preparing the Fiscal 1976 budget, with hard choices made and priorities set." However, as the lead agency for educational R&D, NIE was called to task for failing to play a leadership role and failing to do enough hard thinking about "the more searching questions that might be asked." They noted, for instance, that "Each of the system's institutions has its own sense of function and interests, and with few exceptions, inquiry into mission priorities is not one of them . . ." Their call was for more creative leadership of the system -- coordinating, doing strategic thinking, building consensus, and using system-level monitoring data collection and analysis as a basis for strategic thinking and decision making.[14]

In an addendum to the Campbell Report, Sam Sieber presented a summary analysis of design requirements or underlying dimensions essential for anything one might call an educational R&D system. One set of systemic requirements he dealt with is in the area of goal-setting: "A national R&D system must be able to formulate and gain consensus on a set of clear-cut objectives regarding output." His overall assessment of goal-setting as it was to be observed in 1975 -- only three years ago -- was that the conceptualization of R&D system goals and the development of consensus on priorities was a task which had "barely begun."[15]

Clearly, then, a consistent theme in all of this literature is the inadequacy of macro level goal definition and strategy development.

2. <u>Presentations of Frameworks for Educational R/D&I Goal-Setting and Policy/Strategy Development</u>

We have located five items in the literature which present frameworks useful for thinking about educational R/D&I goal-setting and policy/strategy development. Hendrik Gideonse was the central figure in the preparation of three of these pieces -- two sections in the 1969 OE <u>Educational Research and Development in the United States</u> prepared by Gideonse and his staff for the OECD review (as discussed earlier);[16] the third, an article by Gideonse which appeared the following year in <u>Science</u>.[17] The fourth piece we include in this category is Sam Sieber's analysis of the design requirements for a national R&D system for education.[18] The fifth; a policy analysis we prepared for NIE in 1976, relates system-building purposes to other aspects of NIE's mission as the lead agency for educational R/D&I and suggests some implications for planning, policy development, and allocation of resources.[19] We consider each of these pieces in turn.

What sort of issues and data need to be considered in the various stages of the process of goal-setting, policy development, and policy management? The OE status report presented a conception of policy management for educational R&D which included the following steps and activities:

- Identifying the overall goal and clarifying basic assumptions
- Identifying the priorities
- Identifying R&D goals
- Identifying specific objectives
- Choosing among alternative project and program activities in terms of service to goals and objectives
- Implementing and monitoring specific projects and programs
- Developing and sustaining communication networks to insure appropriate and adequate information flows for planning purposes
- Developing appropriate data input mechanisms for planning and feedback mechanisms for program evaluation
- Providing, identifying, and recruiting supplies of appropriately trained manpower
- Evaluating the impact of R&D in terms of the overall goal of the program.

In a later section, the OE status report presents three different perspectives which raise the kinds of issues Gideonse and his staff viewed as central to the development of a comprehensive strategy for educational R&D.

1. The R&D policy strategy: Of particular importance here are conceptions of "the long-term goal for the relationship of R&D to education" (e.g., assuming that research may or research can improve education), with different implications for R&D policies on funding and building personnel and institutional capabilities.

2. Educational policy strategy: How does one bring together the scientific/technical and professional education communities for the establishment of R&D priorities and for decision making on R&D programs?

3. Change process strategy: In what ways can scientific knowledge affect educational practice? How can educational technology or "engineering" develop useful applications of new knowledge for improvement of educational practice? How does one diffuse educational innovations? What change processes are likely to be most effective in bringing about the improvement of educational practice?

We shall explore these issues more fully later in this chapter.

Many of the ideas suggested in the OE volume were systematized and elaborated by Gideonse in his subsequent Science article. He presented a seven-part analytical structure comprised of five primary elements (contexts, goals, models, manpower and its location, and decision structures) and two secondary elements (priorities and objectives, on the one hand, and strategies and tactics, on the other). The secondary elements are produced by interactions among the primary elements. Abstracting from the presentation,[20] the scheme can be summarized in outline form as follows:

1. Contexts in which policy issues in educational R&D operate

   i. social, political, economic, and philosophical contexts: understanding the present (its achievements and problems), alternatives open to us in the future, philosophies which guide the nation's view of education and its understanding of children both as learners and as present and future citizens

   ii. educational policy issues: short-term, middle-range, and long-range goals of the educational system

   iii. educational system, both core and peripheral: in order to improve educational functions, it is essential to understand the established educational structures, how they operate, what their traditions are, and how they view themselves

   iv. science policy: understanding resources available for R&D in education as part of the available national resources for scientific research

2. Goals: the ultimate purpose of educational R&D (e.g., Is pursuit of knowledge the goal since it might in some way or other improve education? Or, is bringing about improvement of education the goal with creation of knowledge only a means to that end?)

3. Research Definitions, Models, and Descriptors; what educational R&D is and is not, how it "works" or why it doesn't; definitions of R&D functions and how they relate to one another (especially how KP and KU are related); models used to understand the system, ask questions about it, and manage it; understanding of the disciplines and technologies of educational R&D and how educational R&D differs from other branches of science

4. Manpower and its location: how manpower roles and requirements are defined and where those kinds of manpower can be found. How we define manpower in the field (researchers? professional faculties of education? practitioners? parents? learners?) affects answers to questions about availability of manpower, its location, and what might be required financially, administratively, or politically to make use of it effectively.

5. Decision structures: what kinds of decisions have to be made, how they are made, and who makes them. How R&D is defined affects the nature of the decision process and who is involved in it. So will the analysis of contextual issues. Depending on the emphasis given to the role of the science policy context as contrasted to the educational policy or educational system context, differences will emerge in structure and in the personnel involved. If educational research is seen as a social and political enterprise as much as a scientific one, then the decision structures will reflect that.

6. Priorities and objectives, developed after consideration of: the congruence between what society needs from its schools (in the short-, middle-, and long-term period) and what it is getting; the state of knowledge and of R&D technology; the availability of manpower; costs; benefits; scale; political acceptability; etc.

7. Strategies and tactics, reflecting what needs to be supported, who is to play a role, decision structures, models or conceptions of education R&D, conceptions of the kinds of manpower needed to play different kinds of roles and where such manpower might be found or might be expected to work.

The Gideonse policy framework is impressive in scope and extremely useful for thinking about policy planning mechanisms and especially data bases to be developed. We shall return to this point later. A somewhat different but also highly useful, broad-ranging approach to thinking about the development of educational R/D&I policy is Sam Sieber's analysis of systemic requirements to be borne in mind by policy makers if they are at all serious about creating a "national R&D system" in education.

Sieber's framework involves eight design requirements:

1. Functional specialization
2. Balance among:
    a. Functions
    b. Performers
    c. Settings
    d. Decision makers and influentials
    e. Supply (R&D resources) and demand (for these resources)
3. Integration (or interrelation) of:
    a. Functions
    b. Settings
    c. Performers
    d. Decision makers and influentials
    e. Supply and demand .
4. Continuity in:
    a. Policies
    b. Tasks and substantive areas
    c. Personnel
    d. Organizations
5. Adaptability of:
    a. Policies
    b. Functions
    c. Personnel (or criteria of selection)
6. Excellence or quality-control
7. Goal-setting (setting of intermediate objectives that can be operationalized and assessed)
8. Recognition of environmental constraints and potential constituencies (to gain realism and legitimacy)

As lead agency, NIE might use a scheme built on these elements in planning and designing programs and in making decisions among alternatives. The effect might be to increase the possibility that agency actions would contribute to achieving NIE's legislative mandate to "build an effective R&D system."

The lead agency premise was central to one other piece of literature as well. In the policy analysis we prepared for NIE on agency-field relationships, we argued that: (a) NIE is both a mission-oriented R&D agency and the lead agency for federal activity in educational R&D, and that therefore (b) NIE's policies should be developed with an understanding of how its purposes impact on the total educational

R/D&I system. We grouped the system dimensions of NIE's various goals into three categories:

- producing substantive outputs (knowledge, products, etc.)
- building system capacity (institutions, linkages, personnel, etc.)
- affecting the system's environment (support, prestige, legitimacy, etc.)

We argued that procurements tend to be thought of primarily in terms of the first of these categories, i.e., the direct purchase of R/D&I activities to generate knowledge, produce products, etc. What tends to be overlooked is the extent to which these manifestly single-purpose procurements tend to have multi-purpose implications. In almost every procurement (or other action), more than one purpose will be involved, whether implicitly or explicitly, and whether latent or manifest. Thus, awarding a project to one institution (or type of institution) rather than to another may also have an impact on the location of future institutional capacity to carry out certain kinds of R/D&I. Both within single procurements and across an agency's "portfolio" of procurements, we noted, there may be various kinds of interaction effects among multi-purposes. The effects may reinforce each other (synergistic effects). Or they may be incongruent and counteract each other in the manner of "anti-purposes." (The use of RFPs to procure certain kinds of research, for instance, might have anti-purpose effects if the result is to "turn off" the best research talent, suggesting to them that research funding in the field of education is unlikely to be forthcoming without untenable constraints.) Such effects may be immediate in their interaction or observable only in lagged or in second- or third-order manifestations.

The analysis suggested that what was needed were deliberate strategies to capitalize on the multiplicity of consequences from specific actions, to maximize possible gains and minimize possible costs from potential multiple and interaction effects. The argument was premised on thinking of educational R/D&I in system terms and noting key features of educational R/D&I that made the assumption of a system leadership role essential -- e.g., the size, variability, and immaturity of the system and its lack of self-controlling and self-organizing capabilities. If the system-building goal of NIE is accepted, it becomes a key criterion in policy and strategy development, planning, and decision making. We shall return to this argument later.

3. Historical Overviews

We have identified four pieces in the literature which take note of changing emphases on some of these key issues over the past two decades. Generally, these historical perspectives are provided to buttress one or another argument about what is needed for the future, based on perceptions that what has happened so far has been problematic.

In arguing for greater balance as one of several design requisites for a national educational R&D system, Sam Sieber took note of various imbalances over the past fifty years among R/D&I functions, performers, settings, and participants in decision making.

> Field service and testing were supreme for decades; then field-initiated research had a few halcyon years under the Cooperative Research Act; then product development was tremendously inflated; and now it appears that dissemination is being pushed to the fore. (In view of the new emphasis on dissemination, care should be taken to insure that we do not return to the days of field service in a vicious historical cycle.)[21]

Sieber made a similar point in an earlier piece in which he made mention of the particular institutions and personnel who benefitted from each change in program emphasis.

> With respect to balance, the USOE seems to have been victimized by the pulling and hauling of four contending forces or institutional domains: the disciplines, the schools of education, the mission-oriented programs of the Office itself (and their respective lobbyists, administrative spokesmen, and congressional supporters), and SEA-LEA practitioners. From a surfeit of project support during the early years of CRP (Cooperative Research Program)(applauded by the disciplines), the Office moved into an era of institution-building and developmental effort (encouraged by the managerial elite in schools of education and the exemplars of DOD-industrial work) and more recently has sought legitimacy from practitioners and Congress by promising delivery, impact, and closer federal-state collaboration. As each new phase was entered, older programs were emasculated. What emerged was a medley of missions and programs that lacked any semblance of balance.[22]

Shifts in organizational and macro level management strategies are identified in two other pieces -- one by David Clark,[23] the other by Ronald Corwin.[24]

Clark's article traced changed emphases in OE policy from that of a relatively passive bystander collecting statistics and disseminating information (from 1867 when OE was established until the passage of the Cooperative Research Act in 1954), to active support of research, then expanding into development and (since the passage of ESEA in 1965) focusing on creating new organizations and institutions outside the old structures. Without using the term "balance," it is essentially greater balance he too was calling for in pointing to the need for constituency building, for building coalitions including diverse interests and emphases (six of the eight groups he mentioned as illustrative are from the older domain of the professional educators rather than R&D), and reconceptionalizing R&D in a way that allows for and even encourages the active involvement of practice-based and practice-related settings in R&D activities and decision making.

Corwin's piece focused on educational research and examined several shifts in emphasis which have been transforming the field:

1) from small-scale field-initiated research to large-scale, targetted R&D directed by funding agencies;

2) from research carried out by individual researchers (working in isolation) to large-scale research centers; and

3) from a laissez-faire model of research management (with initiative and control largely in the hands of the individual researcher) to a more bureaucratic mode (where initiative and control are generally on bureaucratic levels higher than the researcher conducting the work, often in the hands of federal agencies whose staff design the research to be performed).

The thrust of Corwin's argument is that both the bureaucratic mode of research management and the funding of research through R&D centers ignore the realities of the organization (or disorganization) of research in this country, and have "accentuated many of the problems they were designed to alleviate." Especially, they ignore the distributed location of research talent and the existence of "rudimentary natural research communities" which need to be strengthened. Competitive research procurement and funding of research through R&D centers tied to specific locations tend to undercut the development of such research communities which cross institutional and geographic boundaries. Corwin advocates here the organization of coalitions of researchers functioning in given research areas who comprise such rudimentary research communities. "Such coalitions would provide an independent force with a bargaining power comparable to that of the federal agencies and the universities." Eventually such networks might expand to include individuals and organizations across the institutional spectrum engaged in work relevant to given research areas. Such research networks might be given subcontracting responsibilities for designing research and preparing RPPs. And research might be funded through such collaborative networks if administrative procedures and research management approaches can be designed that "cement collaboration on a larger scale than we have heretofore thought possible." Clearly, the argument has significant implications for goal-setting and policy and strategy development for educational R/D&I. We shall return to these later.

4. Analyses Premised on Differing Conceptions of the Nature of Educational R/D&I

Different models or conceptions of the nature of educational R/D&I, its relationship to the operating system and to improving educational practice, the degree to which it can or should be thought of in system-like terms, etc. -- all have differing implications for answering questions about macro level goals, policies, and strategies. Five such analyses in particular seem to us to be particularly helpful.

Three of these suggest the need for more attention to the operating system, its needs as identified by practitioners, its capacity to function as a viable setting for R/D&I and other modes of self-renewal activity, and the craft-like nature of educational practice which may explain why external R&D has so little observable impact on schools and classrooms. We refer here to the "market model" described by Hendrik Gideonse,[25] the NIE analysis (prepared by Marc Tucker and other key members of the Institute's staff) on "building (KPU) capacity for renewal and reform,"[26] and David Cohen's view of educational practice as a craft-like field.[27]

Two other analyses focus on the issue of whether educational R/D&I can most usefully be thought of as a "configuration" or a "system," each suggesting different approaches to macro level policy and strategy development. We have taken note of these pieces before, and will consider them again here -- Guba and Clark's formulation of "the configurational perspective"[28] and our policy analysis for NIE on the program planning and decision making implications of conceiving of educational R/D&I as a system and acting on NIE's mandate to function as the lead agency for federal activity in educational R&D.[29]

A summary of the relevant arguments made in each of these pieces would seem to be in order.

In his discussion of a "market model" for educational R&D, Gideonse argued that the dominant "science" or "R&D" model was based on faulty conceptions of how improvement is likely to come about in a field like education. As described by Gideonse, the science model assumes that education will be improved as a result of ingenious invention based on sound research. The market, if it is thought of at all, is conceived as passive target user, and it is simply <u>assumed</u> that the fruits of external R&D will be adopted and used, because of their power, logic, quality, effectiveness, etc. The driving force determining what is to be produced, in this "science model" is "the theoretical or technical possibilities emergent from R&D," and the focus of attention is on the state of the relevant knowledge and technology bases and the capacities of R&D performer institutions and personnel.

Instead, Gideonse argued, the focus of attention should be on "market requirements and possibilities" -- what the conditions of that market are and how change in that market occurs (if it occurs at all), what potential clients define as needed and desired, what they are (and are not) likely to use, how the needs they identify and their adoption/implementation choices are affected by value choices, etc. As we shall see shortly, this market model has major implications for almost every issue of macro level goals, policies, and strategies we might consider.

The market orientation is clearly borne in mind in "Building Capacity for Renewal and Reform," a key NIE conceptual and planning document prepared early in NIE's history by Marc Tucker and other key NIE staff members. In this important agency document, Tucker and his colleagues noted the various policy choices which had been made in the previous decade that created a system of new institutions, external to the operating system and to the established units in universities which had traditionally conducted research on education and provided services for school systems. In particular, they noted the decisions (a) not to support development of local school system R&D capacity, and (b) to target R&D toward problems identified on the national rather than the local level. They called for a rethinking of the dominant linear paradigm of R&D thinking and a restoration of greater balance between support for external R&D and operating system self-renewal. Among the kinds of programs described as needed were programs aimed at building operating system capacities for R&D as well as other approaches to locally defined and implemented self-improvement.

In a manuscript currently being drafted, David Cohen argues that various R&D and educational reform projects ran into trouble because "they fundamentally misconceived the nature of practice." He faults the "science view" which he describes as assuming that practice can be improved through improvements developed in settings external to schools and classrooms -- through improvements in the knowledge base of the field, or the materials, technologies, or strategies used by educators, or other approaches to remaking practice from outside the practice system by specialists who are not themselves practitioners.

Cohen proposes as an alternative conceptualization a view of educational practice as a craft. As such, its improvement is dependent on experiental knowledge, trained judgment, and skill, which require developing resources <u>within</u> the work setting of practitioners --

providing the kinds of supports that allow such knowledge to be generated, accumulated, and communicated among practitioners. As in the case of Gideonse' market model, this craft-like view of educational practice has major implications for probably every issue of macro level goals, policies, and strategies we might consider. We shall explore some of these implications shortly.

Finally, we conclude this section by alluding again to the debate between adherents of Guba and Clark's "configurational perspective" and of the more "system" perspective we (and others) have found useful. We have referred to this debate earlier in this chapter and examine it in some detail in our chapter on the institutional base of educational R/D&I. At this point, it should be noted that both perspectives assume that earlier conceptualizations were faulty and created problems which impaired R/D&I functioning.

Guba and Clark argued that the "unified system approach:" (a) was based on "untenable assumptions about how things ought to be" rather than the empirical realities of the world of educational KPU; (b) created unrealistic expectations for educational R/D&I performance; and (c) ignored the legitimate interests of various institutions, agencies, and individuals who are essential parts of the educational KPU community. The result, as they described it, has been to provoke "breakdowns, hostilities, and failures" which have functioned as barriers preventing the emergence of a needed educational KPU constituency. "Such a constituency can emerge and flourish only to the extent to which there exists a conception of educational KPU to which all can subscribe."

On behalf of the "system" view, we have argued as follows: There are several distinct macro-level policy/strategy advantages in treating the educational R/D&I configuration as though it were a system. This view permits the analyst to consider policies in terms of their interactions and side-effects as they may impact the whole domain of educational R/D&I. The view orients the policy and strategy planner toward the system-building requirements of an immature configuration such as exists in educational R/D&I -- for instance, toward the system-capacity-developing aspects of other R/D&I activities. And the view emphasizes such key system design requisites as the needs for balance and integration, which might not receive adequate attention from more atomistic conceptions of educational R/D&I.

Clearly, then, these conceptions are of considerable significance for the way one resolves fundamental issues about macro-level goals, policies, and strategies for educational R/D&I. We turn now to consideration of some of these issues.

II. CENTRAL ISSUES

In a recent article, David Clark called for the development of a broad coalition of diverse interests and the creation of a national conference board type of mechanism to permit this coalition to engage continually in debate and formulation of policy platforms for educational R/D&I.[30] In illustrating why he thought this necessary, he cited a description of the public policy process provided by Stephen Bailey and his associates in their study of school politics in the Northeast.

> Some people want something from government and build a coalition of influence to get it; other people want something different and build a coalition of influence to block or modify the designs of the first group; strategic and tactical campaigns are fought; constitutional wielders of power determine winners and losers by laws passed and executive and judicial actions taken. The process is never-ending. As soon as a governmental decision is made a new dialectic begins.[31]

Our reading of the educational R/D&I literature and our observations on the history of the past two decades suggests that the dialectic over educational R/D&I in this country has revolved around variants of six interrelated issues:

1. Can systematic inquiry increase our understanding of education? And even if it can increase our understanding, can systematic research and/or systematic R&D lead to improvement of educational practice?

2. What is the proper role of the federal government in relation to systematic inquiry? to the improvement of education? to R&D for the improvement of education?

3. Who shall define the goals, priorities, etc., for educational R/D&I? Should some effort be made to balance social demands against R/D&I field/community/system requirements, and if so, how? What is the proper role here of federal agencies, Congress, the research and R/D&I communities and their organized interest groups, professional educators and their organized interest groups, the public and their organized interest groups?

4. What is the proper relationship between the R/D&I system and the operating system? How is improvement of educational practice most effectively brought about? What is the proper balance between external and internal change strategies?

5. What is the proper balance in allocation of resources to:

    a) fundamental research
    b) applied research
    c) R&D/development
    d) dissemination, implementation/utilization support and other linkage strategies
    e) developing internal operating system capacity for improvement of educational practice
    f) immediate problem solution in the "field service" tradition?

6. What is the proper balance in allocation of resources to support of R/D&I activities oriented toward:

    a) producing outputs for the operating system
    b) building capacities to increase the effectiveness of the R/D&I system (i.e., "system-building," "resource-building," "capacity-building")?

Are there ways in which both system-building and output objectives can be met at the same time in the same programs or activities?

We shall consider each of these issues in turn.

1. Can Systematic Inquiry Increase Our Understanding of Education? Can Systematic Research or R&D Lead to Improvement of Educational Practice?

There are actually three interrelated issues here -- whether support for systematic research is likely to lead to the accumulation of a useful knowledge base; whether support for research or R&D is likely to improve practice; and what relative emphases should be given to pursuit of knowledge as an end in itself vs. pursuit of knowledge as a means toward the end of improving education.[32]

A. Pursuit of Knowledge as a Goal: Can Research Increase Our Understanding?

In favor of support for research on (or relevant to) education, one might argue that: (a) a sound scientific basis for understanding such vital aspects of modern life as learning and schooling should be considered a desirable goal in and of itself; (b) despite the accumulation of a significant amount of knowledge about learning, we still have relatively little understanding of the process and the critical factors that affect it;[33] and (c) significant bodies of research relevant to education have succeeded in increasing our understanding, fundamentally altering our conceptions of the learning process and the factors that affect it.[34]

However, on the other side of that debate is the viewpoint often voiced by practitioners (e.g., in surveys of practitioners) and by Congressional critics skeptical of the value of much research supported with federal funds. The key point made here is that much (perhaps most) educational research (or fundamental research that is supported for its potential significance for education) is seen as irrelevant to problems of significance in need of understanding; the topics are often trivial or so abstruse in nature that they could not be of wide interest or likely to increase the understanding of more than a handful of specialists. Given the limited availability of funds and the crying need for immediately needed services and for solutions to operating system problems (that could perhaps best be solved by practitioners if only they could receive adequate supplies of funds), support for the research enterprise is seen as of benefit only to researchers and their institutions, and, from the viewpoint of "national needs" or "operating system needs" (defined by some as one and the same thing), a waste of money and (even worse) a drain on badly needed resources that are in short supply.

The rejoinder from researchers is that fundamental research is driven by questions derived from the intellectual problems that define a field of inquiry at a particular stage of its development; that outside of the logical structure of an inquiry field a research question might appear to be trivial that in fact is central to the paradigms being explored at that time, having implications of potentially vast significance; that the uncertain nature of the research (particularly basic research) enterprise makes unclear where the next breakthroughs of major importance are likely to be and that seemingly trivial questions may in fact be of enormous significance under certain conditions; and so on. Another tack in the researchers' rejoinder might be to acknowledge that, yes, indeed some poor quality and trivial research has been supported -- trivial from the viewpoint of the intellectual paradigm of the disciplines as well as from the social definition of needs -- but that such funded research simply reflected poor decision making by federal agencies and other research sponsors, perhaps lack of proper guidance from the field (or the "right people" in the field), etc.

B. Improvement of Educational Practice as a Goal: Can Research or R&D Lead to Improvement of Practice?

This is a considerably more complex kind of issue. Even if one is willing to answer the previous question in the affirmative and assume that systematic research can increase our understanding of education, assumptions about the extent to which research or R&D can lead to improvement of educational practice involve judgments on several different points. Involved here are judgments on not only the quality and potential relevance or utility of research or R&D outputs but also how educational improvement comes about -- i.e., what is and is not likely to affect what practitioners do and how they do it.

In favor of support for research and R&D, one might make the following arguments:

(a) The more knowledgeable practitioners are about their students, the learning process, the impact of various forces on learning, etc., the more effective they are likely to be.[35]

(b) Several significant bodies of fundamental research <u>have</u> led to substantial improvements in major areas of educational practice -- both in the practitioners' conceptions (e.g., of the learner, the learning process, and therefore the kinds of instructional strategies likely to be effective) and in the procedures and strategies he uses (e.g., I.Q. testing, use of standardized achievement tests, etc.).[36]

(c) Ineffective teaching has been traceable in part to the poor quality of many of the materials, instructional strategies, etc. used. Therefore, one clear route to educational improvement would seem to be use of systematically developed materials, based on sound research, packaged in the most useful forms and adequately evaluated and refined to insure their effectiveness[37]

(d) There are a number of R&D products that have been widely adopted and used and are viewed as substantial improvements over the materials, approaches, etc. they replaced.[38]

However, there are at least three arguments that might be made against these contentions:

(a) There may be some research or R&D that have improved practice. However, there are several bodies of data which suggest that in general educational practice has been little affected by the outputs of either research or R&D.[39]

(b) Most of what we know about schools as organizations and teaching as a profession (or semi-profession)[40] suggests that the outputs of external R&D are not likely to be adopted and used by teachers *as* externally packaged. If externally developed materials and approaches are used at all they are going to be substantially adapted and modified by the user, undercutting the gains one might expect from heavy investment in design and testing of "teacher-proof" materials.[41]

(c) Educational practice is a craft-like field, dependent for its improvement primarily on the development of experiential knowledge, trained judgment, and skill of practitioners within school settings.[42] Research findings or R&D outputs developed external to the work setting are not likely to affect practice in significant ways, or at least are not likely to do so until the capabilities of personnel in the work setting are developed to the point where they can efficiently or effectively absorb these and make them a part of their primarily experiential knowledge base and repertoire of skills.

C. Relative Emphases: Pursuit of Knowledge vs. Improvement of Practice

There are significantly different implications in support of research that is premised on the assumption that research *might* improve education and support premised on the assumption that it *will* bring about such improvement. In one instance, pursuit of knowledge is an end in itself; in the other instance, it is only a means toward the end of improving education.[43] In one case, you might simply ask that research tell you something new that is interesting and hopefully not trivial. In the other case, however, it becomes reasonable to demand relevance, applications, evidence of ways in which a contribution is made to educational practice, etc. The distinction is likely to affect: funding choices about research topics to be investigated; criteria used in judging the significance of completed research; decisions about what happens to research findings once they are arrived at -- the forms in which findings are presented, the target audiences to whom they are disseminated, and perhaps most important, the next round of funding choices about which research areas are to be pursued.

D. Relationship to Other Issues

One's position on this first set of issues is likely to affect one's position on all of the other key issues we consider here. Skepticism about the extent to which anything of value is to be learned from supporting research essentially ends the debate on use of resources to support research or R&D activity and makes it unnecessary to consider these other issues. Positive assessments of the extent to which we can gain understanding from research but less encouraging views of the likely effect on practice suggest support inclined primarily toward fundamental research rather than the more applied functions. An inclination toward improvement of practice as the key criterion against which all choices are to be judged suggests still other patterns of choices and has other implications too, e.g., for who should define priorities. And assumptions about how practice is likely to be improved shape one's orientations toward R/D&I policies and strategies most likely to be effective. These complex interrelationships should become clearer as we explore each of these other issues in more detail.

2. The Proper Role of the Federal Government

If it is agreed that research and/or R&D can potentially increase our understanding of education and perhaps lead to the improvement of educational practice as well, and if it is also accepted that public funds should therefore be used to support research or R&D, then a number of other issues need to be raised about the proper stance of the government in relation to the research and R&D communities, practitioners, and other interested parties.

A. The Laissez-Faire Mode

Should federal agencies function simply as funding channels, with initiative and control over what gets funded and how it is carried out largely in the hands of those conducting the research, R&D, demonstration or other programs? In this kind of laissez-faire mode of management,[44] field-initiated proposals would likely be the main source of ideas for projects to be funded; decisions among proposals might also be made on the advice of the field, as represented on advisory panels; research designs and procedures would be largely under the control of those in the field carrying out the work; and the main audience for the work and the most significant sources of review, evaluation, and critique for sponsored work would also be the field.

B. The Bureaucratic Mode

Or, should federal agencies take a more active role in defining the areas in which work is to be supported and the types of studies and projects to be carried out? This bureaucratic mode of management,[45] characterized by the use of RFPs (requests for proposals) prepared by agency staff members, has become the dominant approach to educational R/D&I funding,[46] and is the focus of considerable debate in educational research and R&D circles.

Although there are many variants, the caricature of this approach in its most extreme form can be summarized as follows:

(a) Agency decisions about "priority areas" reflect the thinking of agency staff (whose judgments may or may not be informed by the thinking of the research or R&D or practitioner communities on such matters). Generally, such choices are oriented primarily toward agency interpretations of social needs (i.e., educational problems) rather than state-of-the-art considerations.

(b) RFPs are often highly specific about the work to be carried out, perhaps even the questions to be explored and the designs and procedures to be used. Such RFPs are often prepared by agency staff, with or often without the assistance of consultants from the field.

(c) Decisions among proposals are made by the agency, with or often without the involvement of consultants from the field functioning as field readers or as members of advisory panels.

(d) Although the field may be an important part of the audience for some presentations of findings, etc.; and be significantly involved in the ultimate assessment of the value of the work produced, the primary (and often the only) audience and locus of review, evaluation, and critique for much of this federally funded work is the sponsoring agency.

C. Open Competition vs. Solicited Work

Should federal agencies identify the work to be funded and then use competitive mechanisms to determine who will be awarded the grant or contract to carry out a specific piece of work? Or should federal agencies solicit work of particular types from specific individuals or institutions known to the agency and judged to be most capable of producing the best quality work of that type?[47]

D. System-Building

Should agency procurement decisions be based only on project-by-project considerations (e.g., who can best carry out this project given available resources) or also on system-building considerations (e.g., how is awarding this contract to this or that institution likely to affect future R/D&I capacity, its quantity, quality, and distribution)?[48]

E. Educational Improvement Strategies

Should federal funding decisions reflect a choice among alternative educational improvement strategies, concentrating resources on what is judged to be the "one best" approach (e.g., R&D)? Or should federal decision makers suspend judgment on the "one best" alternative and take a more mixed approach, disbursing funds somewhat across approaches and permitting future decisions among alternatives to be made (if made at all) on the basis of accumulated experience and data on effectiveness and impact?

F. Choices Among Options and Relationship to Other Issues

How active a stance should the federal government take in shaping educational R/D&I? The various options we have suggested involve increasingly active postures -- from the laissez-faire mode in which initiative and control are largely in the hands of the field; to the bureaucratic mode, where the locus of initiative and control shifts to federal agencies; to solicited contracts and grants (removing the broad field from open competition for particular pieces of work); to system-building, introducing additional considerations such as agency (or perhaps "agency/field")[49] visions for the system's future from an overall macro level perspective. (If R&D is selected as the "one best" route to educational improvement, this too must be viewed as a highly active posture.) The arguments that might be made for or against each option are closely intertwined with one's perspective on each of the remaining issues to be considered. We therefore turn to these other issues.

3. Who Shall Define Goals, Priorities, etc.?

Who should have preponderant influence in determining goals, priorities, policies and strategies for educational R/D&I? Should initiative and control rest with researchers and R&D personnel who are most attuned to the state of the knowledge and technology base of the field and therefore presumably what the system is most capable of achieving and what policies are most likely to bear fruit? Or, should preponderant influence be in the hands of federal officials and staff whose judgments are most likely to be sensitive to national concerns and priorities about pressing problems in need of solution? (And within the federal government, who should define those concerns and priorities -- Congress, the White House, federal agencies?) Or should the locus of initiative and control be shifted to professional educators, who are likely to be most familiar with these problems and the kinds of R/D&I solutions most likely to be implemented and used, and whose commitment to institutionalizing particular solutions will determine the effectiveness and impact of the whole R/D&I enterprise? Should some effort be made to balance "social demands" (as defined by federal government units or by practitioners) against R/D&I community/system requirements, and if so, how? What mechanisms are likely to be most effective in permitting bargaining and development of consensus on questions of goals and priorities? For whom do organized interest groups speak? And what (if anything) can be done to protect the interests of the unorganized -- e.g., the public, researchers or R/D&I personnel not active in professional associations, etc.?

There has been relatively little discussion in the literature about consensus-generating mechanisms,[50] and even less attention to mechanisms for determining the interests of the unorganized as they perceive and define these interests.[51] There has been considerably more attention to different modes of goal-setting and program development, and the most fundamental of choices seem to be among four alternative modes as depicted below. They differ along two dimensions: (a) whether the key mechanisms that determine goals, priorities, etc. are <u>centralized</u> or <u>decentralized</u>; and (b) whether the main actors in goal-setting, etc. are from <u>within</u> the research-R/D&I community or <u>external</u> to it.

GOAL-SETTING MECHANISMS

	Centralized	Decentralized
External to Research-R/D&I Community	A Bureaucratic Mode	D Market-Oriented Mode
Within Research-R/D&I Community	B National Science Policy Mode	C Field-Initiated/ Laissez-Faire Mode

We digress briefly to describe these four modes before returning to the issue of choosing one of these modes or divising some new mix of elements that might provide some new alternative(s).

A. The Bureaucratic Mode

We noted earlier the main elements in the bureaucratic mode of macro level R/D&I management. What is important to underscore here is that the main concern in decision making about the kinds of R/D&I activities to be supported is national-level problem areas as they are defined by federal officials (i.e., agency bureaucrats, taking the lead from, and/or on occasion taking the initiative to influence, Congressional and Administration influentials). In this mode, the bulk of R/D&I funding is generally targetted at major problem areas identified and defined by these federal officials who (in the field of education) are generally identified as external to the research-R/D&I community. In several other fields, there is considerably more overlap between the relevant research communities and key funding agencies, e.g., NIH, with leaders of the field often taking key agency positions for several years and a considerable flow of talent moving back and forth between agency and field. However, this pattern appears to be relatively rare in education.

Where the bureaucratic mode prevails, the research-R/D&I community exercises little if any influence as a community. Individual researchers or R&D specialists or practitioners may exert some influence as advisers to funding agencies; however, even here, those selected to serve as advisers tend to be identified and chosen by agency personnel, often without the involvement of the research-R/D&I community.

To the extent that considerations of resource development or system-building enter into decision making at all in this bureaucratic mode, the focus tends to be on <u>national</u> resources rather than geographic dispersion of resources across regions or localities.[52]

B. The National Science Policy Mode

Were this approach ever to become operative in education, one might envision some centralized body which represented (or was directly influenced by) the leadership of the research-R/D&I community determining the directions of federal funding for educational R/D&I. While this group might not necessarily be insensitive to or uninterested in the kinds of national problems given so much attention in the bureaucratic mode, decision making in the science policy mode would tend to be more oriented toward state-of-the-art concerns -- furthering the development of the field's knowledge/technology base; focusing on the research questions at the frontiers of the most active research areas; choosing among alternatives in terms of where research talent exists, what kinds of research talent, methodologies, and other macro level capacities need to be developed, where fruitful findings are accumulating, etc. Excellence would clearly be a central criterion, and therefore system building concerns would orient them toward developing the highest quality <u>national</u> resources rather than geographic dispersion of resources across regions or localities. Unlike the bureaucratic mode, however, system-building/resource-developing concerns would more likely be central to decision making in this mode dominated by the leadership of the research-R/D&I community.

Federal agency officials might function in a number of ways in such a system. They might serve largely as passive conduits for funds to the activities selected largely by the leadership of the research-R/D&I community. Or, they might operate more actively, either interacting with (negotiating, bargaining, influencing and being influenced by) the research elite and/or being part of that research elite and therefore accorded legitimacy for defining directions and attempting to develop consensus in support of these field-shaping agency decisions. NIH or NSF might be models of how federal agencies might function in this mode.

As to who might be defined as the research-R/D&I community leadership in the education sector, the AERA is the only single body currently in existence which might assume such a role. However, we have seen only occasional evidence of forceful AERA leadership in this direction.[53] There are other hypothetical possibilities -- for instance, Corwin's conception of networks of collaborative "research communities."[54] Clearly, though, the educational research-R/D&I community is too immature and disorganized at this point for this approach to seem like a realistic near-term possibility.

C. The Field-Initiated/Laissez-Faire Mode

Although the bureaucratic and national science policy modes differ in who defines goals, priorities, etc. (whether the locus of initiative and control is to be found in federal agencies or the research-R/D&I community), they are similar in that in either case this initiative and control are centralized. In both cases, some central national-level group(s) have a virtual monopoly on definition of goals, priorities, etc., made from <u>their</u> perspective of what is needed -- either to solve pressing national problems blocking further social progress or key intellectual problems to be solved to push further the frontiers of knowledge and technology. In this respect, both the bureaucratic and national science policy modes differ from the field-initiated and market-oriented modes. In both of the latter approaches, the locus of initiative and control is highly decentralized, dispersed geographically across the country, permitting more pluralistic definition of goals, priorities, strategies, etc., and a considerably larger number of participants in the process.

In the field-initiated or laissez-faire mode, initiative is largely in the hands of the members of the research-R/D&I community. Field-initiated proposals are actively encouraged and presumably supported on a level sufficient to stimulate the continued flow of proposals. Federal agencies act as relatively passive conduits of funds to the field, making funding choices from among the proposals submitted, generally making use of hand-picked advisers from the field. Funding is generally done on a project-by-project basis with little if any consideration to system-building issues. Relevance to social problems may enter decision making, but even more certain to be given weight are standards of judgment internal to functioning of the field -- methodological rigor, contribution to the field's knowledge base, etc.

D. Market-Oriented Mode

In this mode, too, initiative is likely to be dispersed geographically across the country. However, here the key actors defining goals, priorities, etc. are not members of the research-R/D&I community but rather education professionals -- i.e., the practitioners who staff the operating system. This mode differs from all others in the key role of practitioners and their concerns, largely absent from the science policy and field-initiated modes, and present in the bureaucratic mode only as perceived (if perceived at all) by the bureaucrats (or specialist "technocrats"[55]) who staff federal agencies.

As noted earlier, in the market-oriented model described by Gideonse,[56] the focal concerns in decision making are operating system needs as defined by practitioners -- what practitioners define as needed, what they identify as desired, and what they are willing to adopt, install, and use. In this mode, attention is shifted from the national level to the local level -- i.e., to SEAs, LEAs, individual schools, and individual practitioners. Locally defined needs are the focus of selection decisions about R/D&I activities to be funded. System-building considerations are of interest and are defined here as development of local capacities for problem solving. Excellence as this might be defined in the national science policy mode is not considered as important as dispersing R/D&I resources so they are to be found in all localities, available to all operating system sites to solve perceived problems as they arise. If conceived in R/D&I terms, though, the market-oriented mode should not be confused with the old field service tradition in which practitioner-defined problems were met on an individual basis by researchers and others in the field who provided services to schools without concern for capacity-building, generalizability of solutions, diffusion to other sites, and other hallmarks of the R/D&I or renewal approaches.[57]

E. Choices Among Options, New Alternatives, and Relationship to Other Issues

These four modes as described here are gross simplifications of patterns as they have existed or might exist. Empirical reality is not likely to be so neatly patterned. Practitioner concerns may not have been so totally absent from field-initiated or even the science policy modes as suggested here. And certainly many of those agency officials who carried out the bureaucratic mode may have been excellent spokesmen for practitioner concerns, and/or for research-R/D&I community concerns as well. There are numerous instances of overlap between the bureaucratic and science policy modes. And there have been several points in time in which there have been substantial amounts of both targetted (bureaucratic mode) and field-initiated funding even within the same agency. However, we do find the typology useful for thinking about differences among approaches and ~~options~~ that are available.

Arguments made in favor of the more centralized approaches revolve around limited resources and the ways in which available resources have been frittered away on non-cumulative, non-directed, field-initiated (mode C) or practitioner-dominated (mode D) funding patterns in the past. In favor of the bureaucratic mode, a case could be made that: (a) the research-R/D&I community is not otherwise likely to organize activity around national social priorities, that the very nature of knowledge producing fields suggests different priorities and patterns; (b) in the case of education, the lack of strong leadership within the research-R/D&I community might suggest even more of a need for the bureaucratic mode; and (c) the bureaucratic mode might be the best option for balancing social needs (as defined by national priorities and practitioner concerns) with R&D requirements (state-of-the-art and system-building concerns as defined by researchers and R&D personnel).

On the other side of the debate, though, the bureaucratic approach can be criticized on several grounds:

(a) Federal bureaucrats have at times operated from the perspective of their own normative conceptions of how things should be rather than from a sound footing in empirical reality. Consequently, they have neither balanced such diverse interests as the practitioner vs. researcher viewpoints, nor acted as accurate spokesmen of either the practitioner or the researcher perspective, alienating all key parties in the process.[58]

(b) The bureaucratic mode has not been properly informed by state of the art considerations or an adequate understanding of the knowledge base developments, personnel and institutional capacities and other prerequisites essential to carry out the desired work competently. (When turned around, this becomes the crux of the argument for the science policy mode.)

(c) Agency bureaucrats have been naive about the nature of the operating system and the ease with which it could be changed, especially by external strategies. In general they have acted in a vacuum of ignorance about practitioners' needs, desires, constraints, etc. (When turned around, this becomes an important part of the argument for the market-oriented mode.)

Indirectly, we have already considered the case for and against the science policy mode. Yes, decisions are more likely to reflect what the system is and is not capable of achieving given the state of available knowledge, system capacities, etc. And, yes, needed system-building is more likely to be given the attention it warrants. However, on the other side of the coin:

(a) The educational research-R/D&I community is immature and relatively unorganized, fragmented by the multi-disciplinarity of its knowledge and technology base and further hampered by differences between fundamental and applied researchers, researchers from the disciplines and educational researchers,

researchers and developers, etc. There is therefore little reason to believe that the research-R/D&I community could carry out its role in a science policy mode.

(b) Relatively few, high quality cumulative knowledge bases have been developed by the field of education, leaving open to question the existence of an adequate supply of the available know-how to use R/D&I funds to maximum efficiency if the science policy mode did prevail.

(c) Educational research has shown itself to be relatively insensitive to practitioner concerns over the years, suggesting that the chances of ever bringing about educational improvement through the science mode in its pure form are relatively remote.

In favor of decentralized approaches are arguments suggesting that important new sources of ideas may be choked off and heavy investments may be made in faulty conceptions when the locus of initiative and control is highly centralized. In support of the field-initiated mode, one might argue:

(a) Field-initiated funding is needed as a counter-balance to the bureaucratic mode. In part, this is needed to permit research to reflect key questions needed to further the development of the knowledge base as this is understood by the field. In part, it is needed to keep talented researchers attracted to education. The argument here is that first-rate researchers are unlikely to respond to RFPs, to carry out research designed by others, especially if they perceive the research designs called for in agency-defined RFPs as mediocre in quality or misguided. And further, what these first-rate researchers are proposing should be judged on its own terms. Though falling outside the agency-defined areas covered by RFPs, these proposals may involve important new areas of work that could over the long run have more far reaching significance for the field than other projects that currently fall within the agency-defined program. Important first-rate ideas of this kind ~~should be~~ stimulated and encouraged rather than closed off, and the field-initiated mode (or variants of it) is the one most likely to accomplish this.

(b) Field-initiated funding may be equally necessary as a counter-balance to the science policy mode. In the science policy mode, a small elite leadership group in the field are likely to be the dominant influences on the direction funding should take. But scientific progress has often come about from ideas initiating from young turks in a field who start off as a small minority battling against the accepted paradigms. Field-initiated funding might be essential to insure their support while they remain young turks outside the established leadership structure of the field.

(c) Some would argue for field-initiated funding as a valuable approach in its own right, most actively attuned to the disorganized state of scientific activity. For instance, Corwin's call for a strengthening of natural research communities and creating networks within and across these communities might potentially fall within the field-initiated mode or the science policy mode.[59]

On the other side of this debate, though, one might point to the limited gains to date from field-initiated funding.[60] However, it is not entirely clear that this is a valid argument since it would seem necessary first to determine how much of the significant research that has been carried out (as well as how much of the trivial output) has in fact been of the field-initiated variety.

Finally, we come to the market-oriented mode. The key arguments in support of this pattern would seem to be the following:

(a) Relatively little of the research or R&D activity that has originated outside the operating system (or without the involvement of practitioners) has found its way into schools or affected practice.

(b) There is a significant need for improvement of educational practice but the strategies developed until recently have been misguided because they were R&D oriented or problem-oriented without being market-oriented.[61]

(c) R/D&I resources need to be dispersed across the country in the same way that the operating system is dispersed across the country. Improvement can come about if practitioners work with the assistance of others to meet their needs, and they are likely to do this only if the resources are nearby and readily available and accessible to them, able to affect and become a part of the work setting in which they function.

Among the drawbacks of the market-oriented model, though are the following:

(a) There are clear risks of the market-oriented pattern becoming a return to simple delivery of field services, [62] with none of the generalizability or diffusion of solutions and none of the capability development of R/D&I and consequently limited long-term return on the investment.

(b) Given the size of the operating system and therefore the scale across which resources might have to be dispersed, questions of likely quality of outputs and level of impact will inevitably arise. Will sites across the country funded in the market-oriented mode be able to produce systematically tested outcomes of high quality (as might be expected from a small number of institutions funded at a substantial level)? (Of course, given the history of the regional laboratories, the outputs they produced, and some of the recent questioning of the payoff from high development expenditures of nationally oriented laboratories, the potential payoff from the market oriented mode might not seem unattractive.)

One's position on these various questions is likely to be closely intertwined with one's views on the issues of internal vs. external improvement strategies, functional balance, and system-building. We therefore turn to these other issues.

4. Improvement Strategies: External vs. Internal Change Processes

A. External Change Strategies

Several kinds of external change strategies have been proposed. There have, of course, been various kinds of political reform strategies -- citizen participation, decentralization, community control, etc. We take note of these strategies but discussion of them is outside the framework of this analysis.[63] It should be understood for the remainder of this analysis that when we use the term "external change strategy" here our concern is with only one kind of external approach -- R&D or R/D&I.

The external change strategies we consider here have been premised on a mix of assumptions about the nature of schools as institutions, the nature of organizational change, and the outputs likely to be produced through use of R&D approaches.

(a) Schools are described in terms of their change-resisting properties. Since schools are public monopolies, assured of students and funding, operating as public bureaucracies with relatively little public accountability, there are few incentives to change and many incentives to resist change. Educational innovations tend to be "people-change" innovations -- they require unlearning old ways as well as learning new ways, and they are often incongruent with established norms and strongly held values about the role of the practitioner in relation to students, parents, etc. Teaching is described as a semi-profession, thereby characterized by status anxieties that make it difficult for educators to relate openly to external sources of expertise. The general absence of change agents in school as institutions is noted, along with the absence of resource allocations to change functions -- whether in terms of the time available to practitioners, administrators, etc., or the hiring of specialized personnel with change-oriented roles and responsibilities. And so on.[64] The thrust of all these assumptions is that generally change is unlikely to come about in school systems unless the initiative, pressures, design of the innovations, etc. come from the outside.

(b) A relatively simple change process was assumed. A key barrier to improvement has been assumed to be practitioners' lack of sufficient high quality materials and up-to-date information from research, the experience of other practitioners, etc. Consequently, external change strategies focus resources on:

1. development work, producing high quality, systematically tested, effective materials, developed by curriculum and subject matter experts, testers, packagers, etc.; and

2. dissemination and other linkage approaches, to deliver the materials, information, etc. to "users."

In recognition of some of the difficulties encountered in implementing some of these externally developed materials in school systems, various kinds of technical assistance and other implementation supports are a key part of more current conceptions of "linkage." But unquestioned was the operating assumption (if not the theoretical assumption) that the identification of what was to be changed, its design and development, were all to be carried out by specialists (rather than practitioners) functioning in work settings outside the operating system.

(c) The outputs expected from R&D were to be high quality products and programs, clearly superior to conventional products and programs, possibly "teacher-proof" -- i.e., designed to be implemented as developed and expected to produce the same effects in the operating system as in the developers' field tests.

(d) Development costs would no doubt be high since the best talent would be used, along with systematic development procedures, extensive successive cycles of evaluation and refinement, effective packaging (perhaps with needed implementation supports), and specialized dissemination resources. However, over the long run the per unit costs for such quality materials would be low once they were disseminated widely and used in large numbers of schools across the country. The return on investment would be greater than trying to distribute an equivalent amount of funds across the country to support local development in thousands of school districts. The amount available to each district (or even to a large number of selected districts) would probably be too small to support much if any development activity and the outputs produced would probably be of mediocre quality or, even if of apparent good quality, not widely tested or validated or packaged in a way that could permit their use by others. The money might then, in effect, be frittered away on immediate uses lacking generalizability or long-term continued payoff.

The argument in support of external change strategies, then, was that: change was not likely to come otherwise; that the products of external R&D would be clearly superior and therefore willingly and easily implemented (if not easily, then with some technical assistance); that over the long run the R&D approach would be more economical, providing the greatest possible payoff in impact per dollar spent; and that all that was needed was to put into place specialized development institutions and a pipeline for delivering products to users. This may be an oversimplification of the argument. Some recognized the need for adaptation of externally developed outputs, the difficulties of the "teacher-proof" notion, the problems likely to be encountered at the implementation stage as well as earlier. In some discussions, more active roles for practitioners were clearly called for at virtually every step along the way, from need identification through various design and "fine tuning" stages, evaluation, packaging, etc.[65] But regardless of the variants, descriptions of external change strategies did seem to see the operating system largely in terms of being the "user" at the end of the pipeline, a rather different conception from that held by proponents of various internal change strategies.

B. Internal Change Strategies

Proponents of internal change strategies have had more active conceptions of the roles of operating system personnel in the change process. The case for internal approaches has been made on several grounds:

(a) There has not been a sufficient return on the large investment that has been made in external change strategies. Most of the products developed have been of inferior quality in comparison to existing materials developed by conventional (non-R&D) means. And relatively few have been widely adopted and used in school systems. In part this is due to their poor quality. But also of importance here is the fact that operating system needs, constraints, and dynamics have not been adequately taken into account in their development and inadequate attention has been given to the difficulties of implementing externally developed innovations.

(5) It may be that some factors -- such as the nature of schools as institutions or the nature of educational practice as craft-like in its norms, values, and dynamics -- make external change strategies unwise and suggest the greater wisdom of internal change strategies. If there are enormous barriers to implementing externally developed products, programs, approaches, etc., if practitioners need to be able to develop their own solutions to problems to be able to absorb the changes into their experiential knowledge base and their repertoire of skills and approaches, then the development of internal operating system capacities for problem-solution and change would seem to be a more effective strategy. Those who contend that money would be "frittered away" in the old field service tradition fail to see that the funding focus would be on developing practitioners' <u>capabilities</u> (which has long-term implications) rather than simply on the materials they would be developing in the course of building those capabilities (which might or might not have long-term utility). And after all, given the experiential nature of educational practice as a craft-like field, developing practitioner capabilities may be the most sound route to fundamental changes.

(c) There are innovative schools where practitioners develop their own exciting and high quality programs and materials and where principals or others function as educational leaders and change agents (not simply as administrators). Instead of premising change strategies on assumptions about the barriers to change as they appear to be operative in the great majority of schools, it might be wiser to focus on the conditions that support innovation in the more exemplary settings and try to develop similar conditions or supports in other schools and school districts.

C. Choice Between Options and Relationship to Other Issues

Where resources are unlimited, both external and internal change strategies can be supported. However, in a limited resource situation, choices have to be made, if not between one approach or the other than still certainly in terms of how much of the total available supply of resources should be allocated to each approach.

In making such decisions, one is likely to be swayed toward one or the other approach to differing degrees depending on one's position on several issues we have considered. Once having decided that resources should be allocated to the goal of improving educational practice then:

(a) Who is in the best position to determine how these resources might best be spent -- the research-R/D&I community (who are particularly sensitive to the state of the art and the capacities that do or do not exist to produce certain kinds of development outputs) or the practitioner community (who are particularly sensitive to the operating system's perceived needs and to what is likely to be implemented by practitioners in schools)?

(b) Should resources be concentrated in a few quality centers, established to systematically develop for dissemination to schools the best quality products and programs that can be developed (given the state of the art) with the most first-rate R&D talent available? Or should available funds be distributed to school systems to enable them to fund activities of their own personnel, who may not have specialized R&D expertise but who are gifted practitioners capable of developing highly useful programs and materials which they (and probably their colleagues) are likely to use in one form or another?

(c) What kinds of R/D&I activities are most likely to have the best payoff for school improvement -- fundamental research, applied research, development, linkage, developing internal operating system capacities, or providing services to meet immediate practitioner needs?

We have already considered issues (a) and (b). We turn now to (c) above, the issue of balance across functional areas.

5. Balance Across Functional Areas

Debates about the relative merits of supporting basic vs. applied research or research vs. development seem to be endemic to virtually all KPU systems. In education, the situation is even more complicated with arguments voiced about the relative merits of increasing resource allocations not only to (a) fundamental research or (b) applied research or (c) development, but also (competing for attention for ever-larger shares of the total pie), (d) dissemination/linkage functions or (e) internal operating system capability development or (f) immediate problem solution in the "field service" tradition that prevailed prior to the emergence of educational R&D in the '60s.

A. Fundamental Research

Those who advocate strengthening fundamental research make the case we noted earlier:

(a) how little we know at present about phenomena central to understanding education; learning, learning disabilities, human potential, etc.;

(b) the impact fundamental research has had on both our conceptions and educational practice (e.g., in testing);

(c) the fact that it is difficult if not impossible to predict where the next major breakthrough will come that might significantly change the character of education, schooling, and learning; and

(d) a point not alluded to earlier, the argument that one cannot have a viable R/D&I system without a healthy fundamental research enterprise.[66]

B. Fundamental vs. Applied Research

On the other side of the coin is the argument of fundamental research is an expensive luxury for a problem-oriented, multi-disciplinary field like education, especially since the uncertainties and risks are so high and the assurance one can have of pay-off may be lower than for any other functional specialty. This is especially so since what we have learned about the relationship between fundamental research and application suggests that: (a) there is a considerable time lag in such application if it comes at all, that (b) the linkages to utilization are much more direct for applied research and more direct still for development, etc., and (c) that the source of ideas for most applied research and development comes not from fundamental research but from other applied research and development.[67] In turn, then, this all becomes a key part of the argument for support of applied research and for development as well.

C. Development

The case for support of development work carries this argument even further. Basically, the point made is that if new knowledge is to find application in operating system settings it must be packaged in a form that makes the new knowledge immediable applicable to solution of a particular problem and easily usable.[68] In the case of education, the argument often revolves around the poor quality of much of the existing pool of materials and instructional strategies generally available to educators. If only better materials, etc. were available, practitioners would use them and be able to overcome many of the difficulties they have had.

The development position held sway in the late '60s, but it has lost considerable ground since then as other arguments have gained more prominence -- e.g.:

(a) Development costs have been very high and, with some notable exceptions, the outputs have been disappointing in quality.

(b) Many development outputs have been poor in quality because the existing knowledge/technology base was not adequately refined to permit sound development. More research is needed and more attention to the state of the art and refining system capacities. Premature investment in development is wasteful and, even worse, poor quality outputs that are produced decrease the legitimacy of the whole R&D enterprise, making it more difficult to secure R&D resources in the future.

(c) More and more products are being produced but available products are not as widely used as one would have expected. In part, this is because inadequate resources were devoted to dissemination, linkage, and implementation support.

D. Linkage

Thus, the argument on behalf of resources for linkage functions. But at least two arguments can be made against heavy investment in linkage as well:

(a) The linkage strategy assumes that there is a substantial supply of quality products, strategies, etc. to be disseminated and installed in school systems, an assumption that many critics are likely to challenge, and

(b) Many who focus on the craft-like nature of the practice setting, and other technical and motivational barriers to implementing the outputs of external R&D, would probably be skeptical of the gains to be derived from investing in linkages between (1) suppliers of materials packages that are not likely to be used as designed, and (2) potential "users" who are not demanding such packages and tend to resist their use.

E. Internal Capacity Building

This would suggest, then, the need to support the development of internal operating system capabilities. We have already considered the arguments for and against this option.[69]

F. Providing Services

As one final option, an argument could be made that indirect approaches to improvement rarely have the long-term effects expected and therefore it is such long-term approaches that in fact fritter away scarce resources and fail to bring real gains rather than the direct short-term provision-of-services approaches. The services argument focuses on the considerable needs schools have and the budget crunch many school systems have faced, necessitating cutbacks in what have long been considered essential parts of school system offerings. How, ask practitioners, can large sums of money be allocated to lavish R&D programs which produce materials for which there is no market while school systems are cutting back programs in art, music, athletics, counseling services and even established components of the standard subject matter curriculum?

On the other side of this debate are all the arguments we have considered in support of the long-range gains to be expected from systematic inquiry and the various internal and external change approaches to school improvement.

Clearly, one's position on such questions is likely to be determined by one's perspective on who should define goals, priorities, and needs; what approaches are most likely to produce maximum payoff from per dollar investment; and especially the time horizon of one's goals. Consideration of short-term vs. middle-range vs. long-term goals brings us to the final set of macro-level issues of concern to us here -- i.e., how much emphasis in allocating resources should be placed on direct services to school systems (short-term) vs. producing outputs to be used by school systems (middle-range) vs. building capabilities (long-term).

6. Balance Between Producing Outputs and Building Capacities

What is the proper balance between allocating resources to (a) producing outputs for use by the operating system, and (b) building capacities so that better quality outputs can be produced more efficiently and more effectively in the future? (As noted in the previous section, practitioners would likely call for a third item in the balance as well, i.e., considering the need for direct allocations to operating system functioning as a factor to be reckoned in determining the proper size of the slice of the total education pie to be given to either R/D&I output-oriented activities or R/D&I capacity-building.)

On behalf of resource allocation to system-building, several arguments have been made:[70]

(a) The educational R/D&I system is currently immature and underdeveloped and is not likely to be able to operate at a high level of effectiveness for some time to come unless a sizeable investment is made in developing system capacities.

(b) It may be wasteful to invest heavily in R/D&I activities before needed capacities are sufficiently developed, especially personnel with the needed skills, organizational arrangements that permit the necessary resources to be mustered and managed, linkages required to permit smooth flows and interfaces across components of the system, etc.

(c) Procurements to output-oriented activities have inevitable system impact, whether planned or unplanned -- e.g., permitting development of capacities in one set of institutions rather than another, encouraging or "turning off" one set of R/D&I performers or another, etc. If system-building is accepted as a legitimate objective, and if in addition to direct system building allocations (e.g., training programs) some relatively small sum is allocated to developing planning, and coordinating mechanisms to maximize the positive system-building consequences of agency actions, then the long-range gains may be considerable.

(d) System-building requirements are related to system maturation states: as the R/D&I system becomes better developed and more mature, lower levels of resource allocation to system-building objectives will be required.

Although it seems doubtful that arguments would be voiced against system-building objectives in the abstract, decisions about allocations of resources tend generally to either ignore system-building considerations or to decide that other shorter-term needs are more pressing or more likely to provide needed shorter-term payoff.

If an explicit case were to be made <u>against</u> system-building allocations or <u>for</u> other options as of higher priority, the case would probably include some or all of the following elements:

(a) Other needs are more pressing.

(b) Once short-term accomplishments can be pointed to educational R&D will have greater legitimacy and it will be easier to muster political support some time in the future for system-building allocations.

(c) System-building allocations tend to support researchers and R&D institutions without having substantial impact on the probabilities of producing educational improvement. Resources are often diverted to supporting these institutions and personnel to carry out activities they might otherwise carry out that are not directly relevant to educational improvement (i.e., the definition of what capacities need to be developed, and how, differs from the critics perception of what is needed).

(d) Or, given the new orientation toward capacity development in the operating system, resources for capacity development in SEAs or LEAs may be diverted to support operational activities not directly relevant to educational improvement.

(e) Those who take the position that the educational research-R/D&I community can best be understood as a configuration rather than a system might be leary of system-oriented or capacity-developing allocations that appear to smack too heavily of system management or coordination. (They probably would not, however, object to allocations oriented simply toward developing the resources or capacities of individual institutions in the configuration as the institutions themselves define capacities they need to develop.)

As in all the other issues we have considered, one's position on these options is closely intertwined with one's perspective on what is possible, what approaches are most likely to be effective, and what the proper role of government should be.

7. Central Issues: Summary

Over the past two decades, there has been a continuing dialectic between proponents and critics of different approaches to resolving six highly interrelated issues about macro-level goals, policies, and strategies for educational R/D&I:

1. what (if any) gains can be expected from support of systematic research or R&D;

2. the proper role of government in support of research and R&D;

3. the proper balance between goals, priorities, etc. favored by the research-R/D&I community, practitioners, and federal officials;

4. the proper balance between internal and external change strategies;

5. the proper balance across functional areas; and

6. the proper balance between producing R/D&I outputs and building R/D&I capacities.

An overview of key federal funding initiatives over the past two decades, and the various pressures exerted for change in one or another emphasis, should illustrate well the kind of continuing dialectic Bailey described.

III. HISTORICAL OVERVIEW

1. Stage One: Lack of Federal Role (Pre-1954)

Prior to the passage of the Cooperative Research Program in 1954, the federal government was not actively involved in the sponsorship of educational research or school improvement programs. Education was viewed largely as a function reserved by the Constitution for the States. The Office of Education, established in 1867, functioned for 87 years in a bystander role, gathering statistics and disseminating information.[71] There was little if any debate on (or even consideration of) any of the macro-level issues we have considered; none of these matters were thought of as within the purview of federal policy concerns.

Some historical overviews of educational research provide some sense of the kinds of activities being carried out.[72] But information about sources of funding, as best we can surmise, is sketchy or impressionistic. The sources of funding may have been largely universities, philanthropic, or researcher self-funding; the scale of research activities was generally quite small and expenses minimal. In addition to research activities, there was some development work (e.g., in the area of tests and measurements), some internal development and demonstration in the laboratory school tradition (e.g., some of the work of John Dewey), and considerable provision of direct services in the field service tradition (e.g., education professionals in the universities helping practioners as consultants to solve immediate problems, evaluate programs, provide materials to meet a practioner-defined need, etc.)[73]

2. Stage Two: Research Emphasis and Laissez-Faire Mode of Management (1954-1964)

The passage of the legislation establishing the Cooperative Research Program (CRP) in 1954 was the first major breakthrough in support of the position that research can increase our understanding of education and should therefore be supported with federal funds. With the flow of CRP funds which began two years later, federal involvement in educational R/D&I was clearly (if half-heartedly) initiated. The initial appropriation was small ($1 million), and two-thirds of that was earmarked for research relevant to mental retardation. But educational research was thereby established as an item with a claim to federal support.

During the late '50s and early '60s, when the Cooperative Research Program (CRP) was the most highly visible source of educational R/D&I funding, system priorities were determined largely by the community of educational researchers and researchers from the disciplines carrying out studies relevant to education. The dominant mode of funding was field-initiated, and the Office of Education's style of research management was closest to the laissez-faire mode. The Office of Education functioned largely as a conduit of funds to the research community. The locus of goal-setting was decentralized, scattered among all the various researchers and research institutions who submitted field-initiated proposals and the prominent researchers who served on review and advisory panels.

In a researcher-dominated context, research was rather naturally emphasized. Development of the field's knowledge base was <u>the</u> goal of the system; funding educational research projects was essentially <u>the</u> strategy; and funds flowed primarily to the universities where researchers were located. According to Dershimer's account,[74] building a sound research community was one of the key objectives of the CRP program -- attracting first-rate researchers from the disciplines to work on educational problems and building a community of educational researchers and scholars from the disciplines. Clearly, then, there was some direct concern about capacity building objectives, and indirectly, university capacity to carry out education-related research must have expanded during these years.

Even with the CRP emphases clearly established, there were several visible signs of the inevitable dialectic. First, OE staff, leadership, and advisers fought over: (a) the unsolicited field-initiated approaches favored by the research community and OE leadership vs. (b) OE solicited research in support of staff-defined needs and programs, as desired by much of the OE staff [75].

Second, there was a dialectic over the extent to which supported research should be expected to lead directly to school improvement. During these years, the forces mustered on behalf of more direct improvement strategies and research more targetted at application and impact gained increasing influence, winning the next round and becoming the dominant influence in stage three, which we shall turn to shortly.

And finally, there was the dialectic over research vs. R&D or development. While CRP funds were primarily used to support field-initiated research, CRP funds were also used to support two more targetted development programs for curriculum improvement. Most notable in this mode were Project English and Project Social Studies, modelled after another major development initiative begun in the late '50s, the National Science Foundation's Course Content Improvement Program. The NSF programs to redesign and upgrade high school science and mathematics curricula brought leading scholars from the sciences and mathematics into the enterprise of producing courses and materials for high school students -- PSSC physics, BSCS biology, CHEM chemistry, etc.[76] The enterprise sparked the imagination of educational reformers and seemed for a while to offer a model for limitless possibilities in school improvement. Other more applied or developmental work was also supported at this time, such as projects to improve instruction in foreign languages and to increase the application of audio-visual and other media technology to instructional pruposes, both funded by OE under special appropriations mandated by the National Defense Education Act of 1958. There were other development projects as well -- Project Literacy, the Developmental Program, etc. As educational reformers came to see increasing potential for improvement coming from this more directed, more applied route, a new power balance emerged. In the next historical phase of educational R/D&I, the development position won preponderant influence, the terms and context of the debate changed, and a new dialectic began.

3. Stage Three: Development Emphasis and Bureaucratic Mode of Funding (1964-1972)

In the mid to late '60s and early '70s, OE went on what one observer has described as a "development binge".[77] If figures were available on all funding sources and all R/D&I activities carried out, perhaps a more balanced picture would result. But since the dominant and most visible educational R/D&I funding was from OE, and since OE in these years was actively intervening in educational R/D&I to create a whole new system under OE management (which in effect seemed to be defined at the time as the one and only educational R&D system), understanding how macro-level issues were conceived at this time requires focusing on OE's policies and the new dialectic that eventually emerged around these policies and renewed the macro-level debate.

In the mid-'60s, the field-initiated, laissez-faire, research-oriented approach that had characterized much of CRP funding changed drastically and was replaced by a wholly new pattern. Dissatisfaction with the non-cumulative effect of CRP-funded research, its lack of impact on educational practice, and the absence of discernible school improvement as a return on the taxpayers' investment led to the creation of the network of university-based R&D centers, regional educational laboratories, and various other sets of institutions we have discribed elsewhere.[78] They were established as a network external to existing research and practice settings, funded and presumably "managed" by OE to conduct large-scale, mission-oriented, programmatic R&D, focused on the solution of specific educational problems.

The shift from the laissez-faire CRP mode to predominance of the bureaucratic mode of OE management was gradual. When the laboratories and centers were first created, each institution defined its own mission based on the areas of specialization of its senior personnel. Over time, however, with increasing OE use of targetted research programs and procurement through RFPs, the locus of goal-setting, priority determination, and strategy and policy development became highly centralized. The locus of initiative and control shifted to key OE staff members, with some assistance from their advisers whom they selected from the research and R&D communities.[79]

With the shift to a centralized locus of goal-setting, there was a marked change in goals and emphases. There appeared to be less and less funding for such long-range goals as development of the field's knowledge base, and more and more attention to the intermediate range goal of developing products and programs that could solve current operating system problems. Many of the problem areas receiving large allocations of funds (e.g., raising academic achievement of low-income minority students) were defined by social and political forces rather than by the dominant concerns of practitioners at the time, or by the needs of the field's knowledge base, or even by the state of development of the knowledge base or the capacities of the field's personnel and institutional base to permit effective attack on particular problems. The emphasis in funding shifted from research to development. And even the labs and centers which initially had been given the freedom to define their own missions and agendas were given the message that development was "in" and the emphasis was to be on developing packageable products.

The prevailing view at this time appeared to be that: (a) systematic R&D could and would lead to school improvement; that (b) the federal government had a responsibility to define problems in need of solution and channel these funds to institutions which it supported for the purpose of working on these bureaucratically-defined problem areas; that (c) the schools would be reformed from the outside, largely through the route of providing systematically developed and tested quality products to meet needs perceived by federal bureaucrats and their allies in the R&D community; and that (d) immediate problems were so significant and pressing, and R&D so potent an approach for meeting the need, that the bulk of resources should be allocated to development activities rather than to such longer-range objectives as building an R&D community, strengthening the field's knowledge and technology base, or developing personnel or institutional capabilities.

Concern with developing the field's knowledge and technology base had lost center stage and was not only slighted but many of the funding policies and strategies of this period were even inimical to this goal. Considerable resources were allocated to "putting into place" an institutional structure for a new specialized R/D&I system. However, little of the funding was used to build institutional capabilities for longer-term system development. There was some funding for research training programs, but this was discontinued after a few years. [80] As allocations to field-initiated research programs declined and targetted R&D and procurement through RFPs increased, proportionally less and less of available R/D&I resources flowed to the universities, and more and more went to the regional laboratories and the proliferating non-profit and for-profit corporations geared to the marketplace of federal grants and contracts. [81] The effect may have been inimical to long-term growth of system capabilities. The private and quasi-public (labs and center) sectors of the educational R/D&I system expanded, but the academic sector did not share in this growth. First-rate university research talent may have been "turned off" from working on educational problems (at least under OE sponsorship). And equally significant, the training of new research or R/D&I talent in universities may have been adversely affected. Federal funds from training fellowships or R/D&I grants or contracts were no longer available on a broad scale to support graduate students, and the hands-on experience of learning through involvement in faculty research was less widely available.

The development emphasis, the bureaucratic mode of goal-setting and strategy development, the decline of funding for field-initiated research and its resultant impact on universities, and practitioners' dissatisfaction with the whole R/D&I enterprise -- all these factors generated the next phase of the ongoing dialectic. The AERA called for the restoration of greater balance in program planning and considered ways to strengthen the educational research-R/D&I community so that it could assume an active role in "field-based planning." [82] The National Academy of Education issued a report arguing the case for fundamental research -- "massive, lasting changes in education cannot safely be made except on the basis of deep objective inquiry." [83]

And increasing attention was directed at the finding that educational practice was little affected by externally developed innovations.[84]

The stage was set for the next phase in the dialectic -- focused attention on dissemination and on developing operating system capacities and the mustering of forces calling for a renewal of field-initiated research funding. It is difficult to precisely date the end of stage three and the beginning of stage four: the growing influence of the dissemination perspective and the SEA/LEA capacity-building approach was apparent from OE program support at least as early as 1970. The advocates of field-initiated research funding failed to score a significant victory until as late as 1977. Still, 1972 seems to be a reasonable boundary point between stages three and four since the establishment of NIE involved changes of potentially fundamental significance.

4. Stage Four: NIE and Mixed Strategies

A. Significance of NIE's Creation

NIE's share of total federal funding for educational R/D&I represents an even smaller piece of the total pie than OE's -- when OE was the key sponsor of educational R/D&I, and even now after NIE was established to be the lead agency for educational R/D&I. Still, the circumstances that led to the creation of NIE, its legislative mandate to "build an effective R&D system",the labelling of NIE as the lead agency for educational R/D&I and the pivotal role assigned to it in coordinating mechanisms that have been established (especially the new Federal Council on Educational Research and Development) -- all suggest that NIE is now the most critical center of macro-level thinking and certainly the most visible focus of policy determination for educational R/D&I.[85]

The creation of NIE as an R&D agency apart from OE was an important breakthrough in its own right in the evolution of the federal role in the sponsorship of educational R/D&I. It was important, first, because it suggested recognition of research and R&D as institutionalized specialties that warranted support separate and apart from operating system support, and that perhaps required different orientations in policy formation from those likely to dominate an agency tied too closely to practitioners. (Whether or not one views this separation favorably is dependent on one's perspective; but clearly the separation was established.)

Second, much of the initial support for NIE came from leaders of the research community who envisioned NIE as functioning in much the same way (and with the same high status) as such prestigious lead agencies as NSF or NIH. Consequently, they assumed the gap between bureaucrat and research community would be bridged, the research viewpoint would be given more weight, and funding would again be flowing to universities and to researchers to carry out projects the research community could define (or at least willingly acknowledge and accept) as needed.

NIE's creation, then, seemed to suggest a strengthening of the federal commitment to educational research and R&D. We have reviewed the early history of the agency elsewhere, especially its considerable problems with Congressional critics.[86] What is important for our discussion here is that the threatened loss of federal funding for NIE in 1974 seemed to raise questions anew about issues that had presumably been settled permanently a decade earlier. What seemed to be at stake was not simply the fate of an agency but at the same time the future of federal involvement in the sponsorship of educational R/D&I. The lack of political skill of NIE's early leadership may have been a factor in producing the agency's difficulties. But more fundamentally what seemed to be operative was the old dialectic about what, if anything, could be gained from support of educational research or R/D&I, with skeptics appearing (briefly) to be on the verge of gaining the upper hand. NIE's weathering of that turbulent storm indicates that the critics of educational R/D&I have receded in influence again, for a while at least, until the dialectic emerges again in public as part of the policy process.

B. Contrast Between NIE Emphases and Earlier OE Emphases

Our impressions of the contrast between current NIE emphases and earlier OE emphases may need revision after some future analyses are written of R/D&I policies of OE (and other agencies as well), in the '50s and '60s. But for the present, it seems useful to try to pinpoint some of the key differences based on whatever evidence or impressionistic commentary is available.

a. Comprehensiveness and Balance

Overall, the main differences appear to be in the broader definition of R/D&I, more comprehensive conception of types of institutions and personnel comprising the R/D&I system (or configuration), and greater balance in the funding of functional specialties, types of R/D&I institutions, and types of school improvement strategies.

b. Greater Market Orientation

Compared to previous periods, the NIE approach appears to be more of a mix between R/D&I and market-oriented approaches. Whereas the previous emphases in federal involvement had been on developing the field's knowledge base (1954-1964) and solving educational problems through R&D and packaging of solution (1964-1972), the NIE orientation appears to be clearly on improving practice, with with research and R&D materials development concieved in terms of the ultimate goal of school improvement. Research and R&D still receive a large share of available resources.[87] But in the NIE strategy, dissemination, implementation/utilization, and building internal operating system capabilities receive considerable attention as well.

c. Inclusion of Operating System in R/D&I Support

NIE dissemination and SEA and LEA capacity-building programs also suggest a mix of decentralized and centralized initiatives. One aspect of this mix is the attention given to SEAs and (to a lesser extent) LEAs.

While considerable sums of money flowed from OE to the operating system during the 1964-1972 period, these were generally funds for direct program operations and services rather than for R/D&I. And what R/D&I funds did go to the operating system tended to be largely for demonstration projects, i.e., the support of exemplary practices or programs throuth funding provided under ESEA Titles I and III, the Bilingual Program, the Drop-Out Prevention Program, etc. OE continues to support this "exemplary practice" approach to school improvement. What seems significant about the earlier period is that OE apparently distinguished between the "exemplary practice model" and the "R&D model"[88] and most (if not all) of what OE conceived as its R/D&I funding was then concentrated on the labs, centers, and other specialized institutions established by OE to function outside the operating system.

NIE's orientation, on the other hand, appears to be to see SEAs and LEAs as potential sites for R/D&I activity. With regard to such activities NIE program documents describe the federal role as one of facilitating, collaborating, and coordinating, with much of the initiative in goal setting and problem definition decentralized in SEAs and LEAs. Substantial sums are flowing to these SEAs and LEAs to support capacity-building programs that meet needs identified and defined by the SEAs and LEAs and fund capacity-building activities proposed by them.[89] The increasing attention given to these

SEA- and LEA-defined capability-developing programs appears to be part of a discernible shift in emphasis from product development and product advocacy to change process advocacy and change process capability development.[90]

d. NIE-Directed vs. Field Initiated Modes

Still, though, despite some signs of increased market orientation and greater decentralization of initiative to the operating system, the older, bureaucratic mode of goal-setting, strategy development, and procurement appears to prevail (to a greater or lesser degree in different program areas) in the agency's funding of research and R&D. The locus of goal-setting, priority determination, strategy development, etc. has remained largely centralized in the hands of NIE staff and their selected advisers from the field, with resultant continued dissatisfaction in the research-R/D&I community about NIE's emphases in R/D&I sponsorship and the procedures used to procure the work it supports. NIE's program and most of its funding is focused on six "priority areas" selected by NIE's staff and policy-making body (the National Council on Educational Research, NCER) as the most pressing problems the R/D&I system could and should respond to with the greatest concentration of available resources possible. The prevailing procurement approaches used have involved either (a) channeling larger sums to labs, centers, and other specific institutions with a "special relationship" to NIE, or (b) issuing RFP s drafted by agency staff and consultants, some of which have involved tight specification of research questions, research design, instrumentation, occasionally even data analysis techniques.[91] Unsolicited field-initiated research has received relatively little support. Consequently, the research-R/D&I community, who feel they are in the best position to determine what problems need tackling and how best to tackle them, has found itself left with little if any support for the kind of work it would like to do and treated as mere technicians to carry out work designed by others, much of which researchers have criticized as ill-conceived.

NIE has been sensitive to much of the criticism it has received from the field and a number of initiatives have been taken to meet the concerns of the research community. For instance, researchers from a few research areas were involved in the definition of research agendas for their fields (e.g., in conferences sponsored by what were then called the Basic Studies and Basic Skills groups of NIE [92]). Also, some of the recent grants competitions have defined only the areas of research NIE was interested in supporting without specifying particulars of the research to be carried out.[93] In addition, NIE concern about the field's dissatisfaction led to the agency's commissioning our policy analysis on the proper balance between field-initiated and NIE-directed R&D [94] and a second analysis by the National Academy of Sciences on the adequacy of federal policies in support of fundamental research relevant to education.[95]

The outcome of NIE's internal policy debate on funding field-initiated research is a good illustration of the continuing dialectic in the policy process, and the fact that those defeated in one set of battles are likely to continue the fight and try to muster sufficient support until ultimately their view prevails, and the dialectic begins again, albeit with the tables turned and a reversal of "ins" and "outs". Despite the contrary positions taken in two policy analyses commissioned by NIE, the NCER passed a policy resolution in 1977 calling for allocation by 1979 of at least 20% of NIE's funds for the support of fundamental research relevant to education (with an increase to at least 30% by 1985), with at least half of these funds to be allocated in the form of research grants to individual investigators or small groups of investigators (i.e., the old field-initiated mode.)[96] Whether this resolution leads to significant changes in the kinds of work supported, or simply a re-labelling of work that would otherwise be funded, remains to be seen. But the stand expressed in the resolution is important in its own right as a statement of the proper emphasis to be given to fundamental research. It was significant too for reaffirming the principle of maximum possible involvement of the research community in "identifying research needs and research to be supported."

As yet, though, the research and R&D communities have not had anything like the influence of researchers in some of the scientific disciplines. There have been increasing numbers of calls for a strengthening of the research and R&D communities and the development of mechanisms to permit the field to exercise leadership in defining goals and research agendas.[97] We may, then, in time see yet another metamorphasis of goal setting and policy formation in educational R/D&I, with significant implications for R/D&I priorities, strategies, and funding programs.

e. Lead Agency Role

Prior to the creation of NIE, OE was clearly the lead agency for educational R&D as well as the education sector as a whole. NIE's position as lead agency for educational R&D is more complex to carry out given the current context in which it functions: (a) Despite its lead agency status, NIE controls a relatively small piece of the total federal budget for educational R/D&I; it controls fewer R/D&I dollars than even OE whose primary mission focuses on the operating system rather than R&D. And (b) given the more comprehensive concept of R/D&I, and the greater number of institutions and even institutional types included in the broader current conception of R/D&I, a considerably greater number of considerations must enter into functioning as a lead agency.

- How does one coordinate a system made up of so many autonomous actors?
- How can NIE best exercise its leadership role given the small proportion of total educational R/D&I resources it controls?
- How can available resources by properly apportioned across all the various improvement strategies (e.g., external vs. internal), functional specialties, performer institutions, etc. now conceived as essential parts of the educational R/D&I enterprise without dispersing resources too thinly to permit effective functioning, quality outputs, and significant impact?
- Are there ways of using available resources efficiently and economically to achieve multiple purposes and to

permit NIE to effectively exercise its lead agency role despite its limited control of resources?[98] And if so, how does an agency learn to function in such complex ways?

C. The Current Dialectic

The current dialectic seems to us to center on several issues, particularly:

- the manner in which NIE is to carry out its responsibilities as lead agency for educational R/D&I;
- the degree of leadership to be exercised by the field;
- the extent to which higher levels of funding can be channelled to the operating system for internal improvement strategies and the extent to which R&D can become more market-oriented;
- the proper funding balance across functional specialties;
- the extent to which NIE should take a more active role in system-building and capacity development; and
- whether the most effective route to building system capacity is to return to the field-initiated/laissez-faire mode, or instead to more actively solicit work from first-rate R/D&I performers with whom NIE can develop "special relationships," or, rather than either of these alternatives, to continue the current heavy emphasis by means of open competition in response to RFPs.[99]

The more active the stance NIE takes on these issues, the greater will be its need for various kinds of data to inform the processes of goal-setting, priority determination, and strategy and policy determination. But whatever the position taken by NIE, the educational R/D&I enterprise as a whole would seem to require more information about itself, its capacities, and its readiness to successfully undertake alternative courses that might be taken.

We recognize, of course, that one's orientation on most of these key issues is likely to be determined by value positions that are relatively immune to influence, and especially unlikely to be swayed by data. Still, regardless of the goals and strategies decided on, choices on (at the very least) tactics and specific programming may be facilitated and perhaps even affected by several kinds of data. Before concluding this chapter, we briefly consider these data needs.

IV. DATA NEEDS, TO INFORM DECISION MAKING

Several pieces in the literature refer to various kinds of data needed to identify R&D priorities and objectives and plan effective short-term and long-term R/D&I programming.[100] At the very least, it would seem, the following types of data need to be available on an ongoing basis to inform decision making:

1. Data on needs
   A. Information for assessing the gap between (a) operating system performance and (b) its stated objectives, or expectations for operating system performance as expressed by practitioners, policy makers, parents, etc.
   B. Perceived needs, as defined by practitioners, parents, policy makers, etc.
   C. Analyses of current social needs, demands, and conditions, to permit assessments of the relevance and effectiveness of the operating system as currently functioning.
2. Data on Possibilities
   A. Analyses of alternative futures for both education and society, and the implications for both the operating system and the R/D&I system.
   B. Data on supply of R/D&I system outputs vs. demand for such outputs, with implications for bringing the two into better balance (e.g., ways to stimulate demand).
   C. Analyses of available technology, research findings, new conceptions from inquiry, etc. that might have far-reaching long-range implications if they could be effectively applied to the educational context.
3. Data on system capacities in relation to requirements for system-building and/or requirements for effective conduct of specific kinds of R/D&I work.
   A. State of the art in relevant disciplines, research areas, development areas, technologies, methodologies, etc.
   B. Personnel base: types of personnel available, located where(by institutions, geographic distribution, etc.),

with what types of competencies, developed to what level of competence, functioning at what level of productivity; rate of expansion of different segments of the personnel base in relation to different funding initiatives, etc.

C. Institutional base: numbers and types of institutions, located where, carrying out what kinds of R/D&I activity, of what quality, with what levels of productivity, etc.

NIE's Education KCPU Monitoring Program has already begun to collect data on the organizational base of the field. In time, we would hope to see this program expanded to comprehensively cover all these various data needs, and to see indications that such data are being used to inform decision processes.

V. CONCLUSIONS

Educational R/D&I has been criticized repeatedly for weaknesses in goal-setting, priority determination, policy formation, and strategy development.

On the most general level, the goals of federal policy for the system have been reasonably consistent since the federal funding of educational research (and then R&D) began in the mid-'50s. Using the current formulation of these goals (from the legislation that created NIE), these goals have been: to solve educational problems; to improve educational practice; to develop the knowledge and technology base needed for these efforts; and to build an effective R&D system.

However, when analysis proceeds beyond goal statements to specific policies, programs, and activities of federal agencies (especially OE and NIE), and when special note is taken of relative emphases in budget allocations, the picture that emerges is one of marked disconinuity, shifting goals and priorities, and policies and strategies that have not been entirely consistent with some of the system's goals. There appears now to be greater balance in the strategies pursued by NIE; however, it is still too early to see how NIE will carry out its responsibilities as lead agency for educational R/D&I. The implications of how this issue is resolved are likely to be significant.

What has been lacking until recently has been adequate translation of broad goal statements into intermediate goals and objectives specific enough to guide priority determination, policy formation, and strategy development -- and specific enough to serve as benchmarks for measuring system performance. 101

Also lacking have been mechanisms to develop consensus on specific system goals, priorities, policies, and strategies among the various constituencies affected. Determination of educational R/D&I goals, priorities, policies, and strategies is clearly a highly political process. It involves critical choices about how available resources will be used, to what ends, and by whom. Therefore, diverse interests clash here (researchers, R&D personnel with various functional specialties, practitioners, federal bureaucrats, Congress) for the choices that are made determine, in a significant way, who wins and loses -- which institutions will receive funding, which research areas will be supported, what kinds of personnel will be hired, etc. Consensus, then, may never be achievable. Still, if consensus-developing mechanisms were available, key policy debates might be carried out with the active involvement of the principal interests, in a forum that facilitated bargaining, coalition formation, and perhaps greater balance in the choices ultimately made. Of course, open debate, bargaining and balance may or may not be considered desirable depending on one's values and one's current status. But it certainly would facilitate the emergence of a strong constituency for educational R/D&I.

There have been numerous analyses in recent years which have pointed out the need for constituency building to increase support for educational research and R&D.[102] Many of the funding problems encountered by educational R/D&I have been traced to the lack of a constituency to push for R/D&I funding -- the lack of an adequately organized research or R&D constituency, and the absence of practitioner demand for the outputs of R/D&I.

In contrast to this view, Dershimer has suggested in his history of federal sponsorship of educational R&D in the '60s that thinking in terms of political constituencies pushing for R&D is a faulty conception for understanding what happened in Washington in the '60s. As he described federal policy development for education R&D during the '60s, a small number of bureaucrats, with the support of a small number of allies in Congress and in the research community, were able to push through their ideas without relating to any external constituency and without resorting to pressure politics as this has been traditionally understood. But of course the isolation of policy impetus from the principal interests affected may explain why educational R/D&I has been operating without a constituency (of practitioners, researchers, or R/D&I personnel) -- and has encountered so much political difficulty.

We have focused our attention in this chapter on the key macro-level issues at the center of the dialectic over educational R/D&I for the past two decades or so. We have noted, too, that historically there has been a close relationship between the dominant goals and priorities, on the one hand, and the primary locus of goal-setting and priority determination, on the other. Inevitably, the dialectic will continue. Such a dialectic may be inherent in the nature of a field such as education, which is value-laden, substantially fragmented, and lacks success models that are so overwhelmingly persuasive that other approaches are no longer put forward. But the continuing dialectic need not produce the sharp discontinuities in functioning evidenced in the history of educational R/D&I over the past two decades. Consensus-building mechanisms may, then, be a high priority system need, to provide the degree of stability and continuity required for further system maturation.

FOOTNOTES

1. For instance, see: Sam D. Sieber, "Organizational Influences on Innovative Roles,"In T.L. Eidell and J.M. Kitchel, eds., Knowledge Production and Utilization in Educational Administration (Eugene, Oregon: Center for the Advanced Study of Educational Administration, 1967).

2. Egon G. Guba and David L. Clark, The Configurational Perspective: A Challenge to the Systems Field of Educational Knowledge Production and Utilization (Washington: Council for Educational Development and Research, 1974). The original was prepared as the keynote address for the annual CEDaR conference in December 1974 and subsequently published as a CEDaR monograph. For a summary presentation, see Egon G. Guba and David L. Clark, "The Configurational Perspective: A New View of Educational Knowledge Production and Utilization," Educational Researcher, Vol. 4, No. 4, April 1975.

3. For instance, see the following documents prepared by our group, all available from The Center for the Interdisciplinary Study of Science and Technology, Northwestern University, Evanston, Illinois: Michael Radnor, Harriet Spivak, Durward Hofler, and Earl C. Young, Agency-Field Relationships in the Educational R/D&I System: A Policy Analysis for the National Institute of Education, 1976; Michael Radnor, Durward Hofler, and Harriet Spivak, "Draft Materials for the National Council on Educational Research Report to Congress," 1976; Michael Radnor, Harriet Spivak, Earl C. Young, Durward Hofler, and Raymond J. Buckley, Comparative Research, Development and Innovation: With Implications for Education: Abridged Report for the National Institute of Education, 1977; Michael Radnor, Harriet Spivak, and Durward Hofler, Research, Development and Innovation: Contextual Analysis, 1977; and Michael Radnor and Durward Hofler, Policy Studies in Research, Development and Innovation, 1977.

4. For instance, see Far West Laboratory for Educational Research and Development, Program Documents: A Report on Program Decision-Making (Berkeley: Far West Laboratory for Educational Research and Development, 1967), ERIC ED 070 178.

5. Office of Education, Educational Research and Development in the United States (Washington: OE, 1969). Also, see a commissioned report prepared as background material for parts of the above: John Lindeman, Stephen K. Bailey, Joel S. Berke, and L. H. Naum, Some Aspects of Educational Research and Development in the

United States -- Report for the OECD Review (Syracuse: Policy Institute, Syracuse University Research Corporation, 1969), ERIC ED 048 135.

6. Norman C. Thomas, "Policy Formulation for Education: The Johnson Administration," Educational Researcher, Vol. 2, No. 5, May 1973.

7. Stephen K. Bailey and Edith K. Mosher, ESEA: The Office of Education Administers A Law (Syracuse: Syracuse University Press, 1968).

8. Richard A. Dershimer, The Federal Government and Educational R&D, (Lexington, Massachusetts: Lexington Books, D. C. Heath and Co., 1976).

9. Roald F. Campbell et al., R&D Funding Policies of the National Institute of Education: Review and Recommendations, Final Report of Consultants to The National Institute of Education and the National Council on Educational Research (Washington: National Institute of Education, 1975), Chapter IV, "The Context for Policy-Making at NIE."

10. Stephen K. Bailey, "Significance of the Federal Investment in Educational R&D," Journal of Research and Development in Education, Vol. 2, Summer 1969.

11. Organisation for Economic Cooperation and Development, Reviews of National Policies for Education. United States (Paris: OECD, 1971). Also, for discussions of the OECD findings, see: Hendrik D. Gideonse, "The OECD Policy Review of U.S. Educational R&D," Educational Researcher (Newsletter), Vol. 21, April 1970, pp. 5-8; and Judith S. Silverman, "Research Planning in the National Center for Educational Research and Development," Educational Researcher (Newsletter), Vol. 21, May 1970, p. 9.

12. Office of Education, Educational Research and Development in the United States (Washington: OE, 1969), p. 185.

13. Hendrik D. Gideonse, "Policy Framework for Educational Research," Science, Vol. 170, December 4, 1970, p. 1054.

14. Campbell et al., R&D Funding Policies of the National Institute of Education, op. cit.

15. Sam D. Sieber, "The Requirements of a National Educational R&D System," Appendix A in Campbell et al., R&D Funding Policies, op. cit. A version of the Sieber piece was reprinted with the same title in the Educational Researcher, Vol. 4, No. 11, December 1975.

16. Office of Education, Educational Research and Development in the United States, op. cit., Chapter VI, "The Management of Educational Research and Development," especially pp. 93-100; and Chapter XII, "Conclusions and Issues," especially pp. 187-190.

17. Gideonse, "Policy Framework for Educational Research, op. cit., pp. 1054-1059.

18. Sieber, "The Requirements of a National Educational R&D System," op. cit.

19. Radnor, Spivak, Hofler, and Young, Agency-Field Relationships in the Educational R/D&I System, op. cit.

20. The outline here includes both paraphrasing and direct quotation.

21. Sieber, "The Requirements of a National Educational R&D System," op. cit.

22. Sam D. Sieber, "Federal Support for Research and Development in Education and Its Effects," National Society for the Study of Education Yearbook, 1974.

23. David L. Clark, "Federal Policy in Educational Research and Development," Educational Researcher, Vol. 5, No. 1, January 1976.

24. Ronald G. Corwin, "Beyond Bureaucracy in Educational Research Management," The Generator (Newsletter of Division G, American Educational Research Association), Vol. 5, No. 2, Winter 1975.

25. Hendrik D. Gideonse, "Research and Development for Education: A Market Model," in The Oregon Studies in Educational Research, Development, Diffusion, and Evaluation. Vol. III; Conceptual Frameworks for Viewing Educational RDD&E, H. Del Schalock and G. Roger Sell, eds. (Monmouth, Oregon: Teaching Research, Oregon State System of Higher Education, 1972); also see Hendrik D. Gideonse, "Elements of a National Science Policy: A Perspective from the Behavioral and Social Sciences," Paper submitted to the Subcommittee on Science, Research and Develop-

ment, Committee on Astronautics, U.S. House of Representatives, September 11, 1970, Reprinted in The Oregon Studies, op. cit. Vol. II: The Literature of Educational RDD&E, Bette C. Porter, ed.

26. Marc Tucker, Mary Harahan, Berlin Kelly, Ward Mason, and Saul Yanofsky, Building Capacity for Renewal and Reform: An Initial Report on Knowledge Production and Utilization in Education (Washington: National Institute of Education, 1973), ERIC ED 087 095.

27. David K. Cohen, Ideas and Action: Social Science and Craft in Educational Practice, Chapter I, (Cambridge: Harvard University Graduate School of Education, June 1977), unpublished manuscript draft.

28. Guba and Clark, "The Configurational Perspective," op. cit.

29. Radnor, Spivak, Hofler and Young, "Agency/Field Relationships in the Educational R/D&I System," op. cit.

30. David L. Clark, "Federal Policy in Educational Research and Development," op. cit.

31. Stephen K. Bailey, R. T. Frost, P. E. March, and R. C. Wood, Schoolmen and Politics (Syracuse: Syracuse University Press, 1962), p. 57.

32. These issues are identified in: Clark, "Federal Policy in Educational Research and Development," op. cit.; and Office of Education, Educational Research and Development in the United States, op. cit.

33. For instance, see: H. A. Averch et al., How Effective is Schooling? (Englewood Cliffs, New Jersey: Educational Technology Press, 1974); and J. M. Stephens, The Process of Schooling (New York: Holt, Rinehart & Winston, 1967).

34. For instance, see: Lee Cronbach and Patrick Suppes, eds., Research for Tomorrow's Schools (New York: Macmillan, 1969); Daniel E. Griffiths, "The Ten Most Significant Educational Research Findings in the Past Ten Years," as reprinted in The Oregon Studies, op. cit., Vol. II; National Academy of Sciences, Fundamental Research and the Process of Education, Final Report of the Committee on Fundamental Research Relevant to Education, Assembly of Behavioral and Social Sciences, National Research Council, Sara B. Keisler and Charles F. Turner, eds. (Washington: NAS, 1977); J. W. Getzels, "Paradigm and Practice: On The Contributions of Research to Education," mimeographed, as cited in

Office of Education, Educational Research and Development in the United States, op. cit.

35. This may, of course, be a statement of faith. It should be noted, though, that the bulk of the curriculum of teacher-training institutions and state certification requirements for teachers, administrators, and other school professionals reflect this assumption.

36. For instance, see: Cronbach and Suppes, Research for Tomorrow's Schools, op. cit.

37. For elaboration of this argument, see our chapter on educational development.

38. For examples, see the section on exemplary products in our chapter on educational R/D&I outputs, or see National Institute of Education, 1976 Databook, op. cit.

39. See discussions of this in our chapters on the history of educational R/D&I and educational R/D&I outputs.

40. For an excellent analysis of teaching as a semi-profession and the impact of this status on practitioners, see Sieber, "Organizational Influences on Innovative Roles," op. cit.

41. See our chapter on implementation/utilization of educational R/D&I.

42. Cohen, Ideas and Action: Social Science and Craft in Educational Practice, op. cit.

43. Gideonse, "Policy Framework for Educational Research," op. cit.

44. Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

45. Ibid.

46. See our chapter on educational R/D&I funding.

47. Campbell et al., R&D Funding Policies of the National Institute of Education, op. cit.; Radnor, Spivak, Hofler, and Young, Agency/Field Relationships in the Educational R/D&I System, op. cit.

48. Radnor, Spivak, Hofler, and Young, Agency/Field Relationships in the Educational R/D&I System, op. cit.

49. Ibid.

50. One exception here is the piece by Clark, "Federal Policy in Educational Research and Development," op. cit. in which he suggested as a possibility a national conference board "to formulate a national policy and action platform for educational R&D" similar to the work done in mobilizing school support on the state level by the New York State Educational Conference Board as described in Stephen K. Bailey, R. T. Frost, P. E. March, and R. C. Wood, Schoolmen and Politics (New York: Syracuse University Press, 1962).

51. A possible mechanism for this purpose might be regular surveys of practitioners such as the approach taken in the survey of practitioners made for the OE status report as reported in Lindeman, Bailey, Berke, and Naum, Some Aspects of Educational Research and Development in the United States, op. cit. and also in Office of Education, Educational Research and Development in the United States, op. cit. Surveys of practitioners had been included in some of the planning documents of NIE's Dissemination and Resources Group, but as yet, to our knowledge, no such surveys have been undertaken. The annual Gallup polls on education, or some similar regularly conducted poll, might be used as a mechanism for surveying public opinion on relevant issues.

52. There have, of course, at times been exceptions to this, e.g., the establishment of the regional laboratory program in the mid-'60s, the recent return to Congressional interest in regional programs for education, NIE's current planning toward a regionally organized RDx (R&D exchange) program, NIE's support for programs to develop dissemination capacities in SEAs and local problem-solving capacities in LEAs.

53. For instance, Dershimer's call for more "field-based planning" in Richard Dershimer, ed., The Educational Research Community: Its Communication and Social Structure (Washington: American Educational Research Association, 1970), ERIC ED 057 275, and the thrust of this volume as a whole.

54. Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

55. For an analysis of agency bureaucrats as "technocrats" see Dershimer, The Federal Government and Educational R&D, op. cit.

56. Gideonse, "Research and Development for Education: A Market Model," op. cit. We describe this model earlier in this chapter in section I.4.

57. Sieber, "Federal Support for Research and Development in Education and Its Effects," op. cit.

58. See: Dershimer, The Federal Government and Educational R&D, op. cit.; and Guba and Clark, The Configurational Perspective, op. cit.

59. Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

60. This was, for instance, the main argument against the CRP pattern of funding and a key element in the argument for programmatic R&D and the creation of the labs and centers.

61. Gideonse, "Research and Development for Education: A Market Model," op. cit.

62. For a good description of the field service tradition and how it differs from the R&D conception, see Sieber, "Federal Support for Research and Development in Education and Its Effects," op. cit.

63. For an elaboration of these political reform strategies and their underlying assumptions, see Harriet Spivak, School Decentralization and Community Control: Policy in Search of a Research Agenda (New York: Center for Urban Education, 1973), available from Harvard Graduate School of Education as Special Qualifying Paper Submitted by Harriet Spivak.

64. For citations and an elaboration of these various analyses of schools as institutions and teaching as a profession, see our chapter on implementation/utilization of educational R/D&I.

65. Radnor, Spivak, Hofler, and Young, Agency-Field Relationships in the Educational R/D&I System, op. cit.

66. Ibid., especially on point (d).

67. Ibid., see especially C. W. Sherwin and R. S. Isenson, First Interim Report on Project Hindsight, June 30, 1966. No. AD 642-400, Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia.

68. For instance, see Launor F. Carter, From Research to Development to Use (Santa Monica, Calif.: System Development Corp., 1966), ERIC ED 026 741.

69. See section II.4.

70. Radnor, Spivak, Hofler, and Young, Agency-Field Relationships in the Educational R/D&I System, op. cit.

71. Clark, "Federal Policy in Educational Research and Development," op. cit.

72. For instance, see Cronbach and Suppes, Research for Tomorrow's Schools, op. cit., Chapter 11 (by Lawrence Cremin); also, Dershimer, The Federal Government and Educational R&D, op. cit.

73. On the field service tradition, see Sieber, "Federal Support for Research and Development and Its Effects," op. cit.; Sam D. Sieber and Paul Lazarsfeld, The Organization of Educational Research in the United States New York: Bureau of Applied Social Research, Columbia University, 1966.

74. Dershimer, The Federal Government and Educational R&D, op. cit.

75. Ibid.

76. See our discussions of this in our chapters on the history of educational R/D&I outputs, and especially the development function.

77. Sieber, "Federal Support for Research and Development and Its Effects," op. cit.

78. See our chapter on the history of educational R/D&I and especially our chapter on educational R/D&I institutions.

79. Dershimer, The Federal Government and Educational R&D, op. cit.; and Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

80. See our chapter on the personnel base of educational R/D&I.

81. Tucker et al., Building Capacity for Renewal and Reform, op. cit.; NIE, 1976 Databook, op. cit.; Albert D. Biderman and Laure M. Sharp, The Competitive Evaluation Research Industry (Washington: Bureau of Social Science Research, Inc., 1972); and Ilene N. Bernstein and Howard E. Freeman, Academic and Entrepreneurial Research: The Consequences of Diversity in Federal Evaluation Studies (New York: Russell Sage Foundation, 1975).

82. Dershimer (ed.), The Educational Research Community: Its Communication and Social Structure, op. cit.

83. Cronbach and Suppes, Research for Tomorrow's Schools, op. cit.

84. For instance, see: John I. Goodlad et al., Looking Behind the

Classroom Door (Worthington, Ohio: C. A. Jones, 1970); and Seymour B. Sarason, The Culture of the School and the Problem of Change (Boston: Allyn and Bacon, 1971).

85. It should be borne in mind, of course, that NIE is only one of many sponsors of educational R/D&I activity. If one is oriented toward the configurational perspective, or if one views notions about system management or other types of macro-level thinking as sheer foolishness (or worse), then the mission definitions, objectives, etc. of all other sponsors and performer institutions may be seen as equally important centers of influence for shaping the realities of educational R/D&I. And certainly regardless of one's perspective on this matter, it would seem important for us to have this kind of information from these various other agencies and institutions, to permit us to develop a sense of the whole that may be more or less susceptible to coordination or management. However, we have come across relatively little in the published literature that is helpful for developing a clear picture of the goals, priorities, policies, or strategies of these other agencies or institutions. There is, on the other hand, a sizeable literature on NIE's approaches and we are familiar with much of this. We therefore focus our attention on NIE alone for the remainder of this discussion. Although we acknowledge the limited focus of this discussion, we are not overly troubled by it. If one is willing to give any substance to the "lead agency" mandate, then NIE's positions and strategies must be considered to be of substantial consequence for the educational R/D&I enterprise as a whole.

86. See our chapter on the historical development of the educational R/D&I system.

87. See our chapter on educational R/D&I funding for details.

88. Ward S. Mason, "Issues Related to the Transfer of the R&D Center and Educational Laboratory Programs to the National Institute of Education," Internal Memorandum, National Center for Educational Research and Development, Office of Education, July 17, 1972.

89. See: NIE, 1976 Databook, op. cit.; also NIE documents for 1976 and subsequent years entitled FY ____ Program Budget or Fiscal Year ____: Program Plans. Executive Summary; see especially NIE, Preliminary Program Plans FY 78 (Washington: NIE, July 1976) and NIE, Dissemination and Resources Group, Program Plan FY 1978 (Washington: NIE, August 1976). It should be noted that OE was funding such programs at least as early as 1970.

90. William J. Paisley et al., Recommendations for the Dissemination and Utilization Program of the National Institute of Education, Report of the Research Advisory Committee on Change Processes

in Education (Washington: National Center for Educational Communication, Office of Education, 1972), ERIC ED 088 412.

91. See our chapter on funding for a discussion of the pros and cons of procurement through RFPs.

92. Patricia E. Stivers, "Researchers at NIE: From Planning into Action," Educational Researcher, Vol. 3, No. 5, May 1974.

93. For instance, see: NIE, Grants for Research on Organizational Processes in Education (Washington: Group on School Capacity for Problem Solving, NIE, 1977).

94. Radnor, Spivak, Hofler, and Young, Agency-Field Relationships in the Educational R/D&I System, op. cit.

95. National Academy of Sciences, Fundamental Research and the Process of Education, op. cit.

96. National Council on Educational Research, "NCER Program Committee Report and Draft Policy Resolution on Fundamental Research Relevant to Education" (Washington: NIE, July 8, 1977).

97. For instance, Dershimer, The Educational Research Community: Its Communication and Social Structure, op. cit.; and Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit. Also significant here would seem to be the functioning of the AERA's recently organized political liaison committee.

98. On this point, see Radnor, Spivak, Hofler, and Young, Agency-Field Relationships in the Educational R/D&I System, op. cit.

99. On this last point see: Ibid.; Campbell et al., R&D Funding Policies of the National Institute of Education, op. cit.; and our chapter on the funding of educational R/D&I.

100. Office of Education, Educational Research and Development in the United States, op. cit.; Gideonse, "Policy Framework for Educational Research," op. cit.; and Sieber, "The Requirements of a National Educational R&D System," op. cit.

101. Sieber, "The Requirements of a National Educational R&D System," op. cit.

102. The most recent of these is probably Clark, "Federal Policy in Educational Research and Development," op. cit.

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER FOUR

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CHAPTER FOUR

INSTITUTIONAL BASE

CONTENTS

I. "CONFIGURATION" OR "SYSTEM"?

An effectively, functioning, mature R/D&I system must have a network of stable institutions which are properly attuned to their various functions and appropriately linked to each other and to users. Mature R/D&I institutions have generally shown a high degree of functional specialization and strong linkages across specialties covering all aspects of the innovation process.

The institutional base of educational R/D&I has been expanded and strengthened substantially over the past two decades. However, compared to many other fields, the network of institutions that carry out research, development, and other innovation functions for the field of education appears to still be weak and immature. Several functional specializations are still lacking or only in their infancy. Key linkages are lacking or only minimal. The institutional network in education is so weak and diffuse that two leading theorists of educational R/D&I, Egon Guba and David Clark, have argued that it is erroneous to even think of these institutions in terms of a "system" orientation. Rather, they prefer a conceptualization which describes this network as a "configuration," akin to a "community" of independent institutions with their own disparate goals and decision structures.

> Thus, the KPU community is described, in the configurational view, as highly decentralized, consisting of a number of more or less independent and co-equal members, who may from time to time find it helpful to form temporary alliances but who, in the main, retain their independence, shun authority and activity relationships, and engage in as many different kinds of KPU activities as seem to be needed and feasible for them to maintain their self-sufficiency.[1]

The policy significance of this perspective is considerable. Guba and Clark have argued that educational R/D&I policy should be based on acceptance of the structure of the field as it is today (rather than how it might be some time in the future) and acceptance of the fact that these disparate institutions have legitimate interests that must be taken into account in the development of policy, and that they cannot be forced to function in a manner they view as contrary to their interests. As described by Guba and Clark, policies which assume the existence of a "system" and call on organizations to function in a manner consistent with some normative view of how things "ought" to be rather than a realistic assessment of how things in fact "are" can only turn these institutions away from participating in federal initiatives. It is this factor, they argue, which explains why educational R/D&I has been functioning for so long without a strong political constituency. Federal policymakers, according to this view, have developed policies according to <u>their</u> notions of what the institutional configuration should look like rather than perceptions of key actors as to the way things in fact are and are likely to remain, regardless of federal policy initiatives.

The configurational perspective won substantial acclaim when it was first propounded and publicized. And it did a considerable service to the field in pointing attention to the broader, more comprehensive view of educational KPU that NIE's leadership was already accepting -- that educational innovation involved a broader range of functions than simply research, development, and dissemination; that the institutional base of educational R/D&I included not only the network of federally funded organizations external to the operating system, created and nourished by federal policies in the 1960s, but also private sector organizations, linkage organizations, and especially existing operating system organizations (SEAs, LEAs, etc.) that were producers of educational outputs as well as consumers, and the various teacher training institutions, commercial publishers, and other organizations that had long functioned as ancillary supports to the educational system. This broad view of educational KPU is the basis of most current thinking in the field, and clearly the configurational perspective and its advocates did much to root this broader view more firmly in the thinking of the field.

Still, we have argued consistently throughout all of our analyses for a systems perspective, as more useful for developing policies oriented toward building and strengthening system functioning while also producing needed outputs and providing needed services. A key premise of all of our work has been that the institutions and personnel involved in the production and utilization of educational R/D&I outputs form a "system" and not just an unconnected "configuration" of entities. Acceptance of this premise does not deny that there can be and often is only a weak linkage or integration between institutions which should be more closely related and whose goals might show more coherence. Nor do we imply any monolithic, centralized network. But there are very significant implications for long-term planning and monitoring and for the development of initiatives by a federal agency that do come from such a "system" perspective.

Of immediate importance for policy development, the system notion focuses attention on how elements interact, and therefore how decisions made in relation to one issue or one set of institutions can have significant implications for other issues and other institutions. Therefore, possible courses of action come to be considered in terms of their possible repercussions and side-effects throughout the system and not simply in terms of the immediate case at hand.

Of more long-term importance, the system perspective directs attention in policy development to capacity building and system maturation requirements. It enables us to apply what we have learned from other R/D&I systems about the stages of system maturation and the kinds of policy options likely to further and speed the maturation process. It also permits us to consider not only what is generic to R/D&I systems but also what modifications seemed to be called for by the specific features of the educational context.

There has been a lively debate in the educational community as to whether or not the educational context is so unique that systems notions from other fields cannot be validly applied. One school of thought argues, for instance, that education is a practice-based field relying largely on a craft form of knowledge that is experiential and holistic and must be developed in the practice setting by practitioners.[2] If this is true, does it make sense to develop policies to support the development of a highly specialized network of institutions, mostly outside the practice setting, to develop new knowledge, programs, practices, materials, etc. that simply cannot be absorbed by the practice setting given its current modes of functioning?

Can policy be developed that suitably takes into account both the field as it is today and the field as it might be? We think so, and we argue throughout this volume for policies which we believe <u>do</u> give ample weight to both existing realities and possible futures. However, before we can adequately develop such policies, we will need to know considerably more than we do now about what the existing realities are. We shall therefore review in this summary chapter what sorts of information are already available about the field's institutional base, and what more we will need to know before we will be in a position to develop workable policies.

II. STRUCTURAL CHARACTERISTICS OF THE INSTITUTIONAL BASE

Analysis of the structure of the educational R/D&I system suggests the existence of several parallel subsystems characterized by minimal specialization, considerable redundancy, looped as well as adjacent clusterings of functions, major gaps between functions, and inadequate linkages among subsystems as well as functions. The overall structure is diffuse, much of it lacks formalization, and whatever centralization or coordination might seem to be inherent in the dominant role of the federal government in R/D&I sponsorship is more potential than operational at this time.

The focus of our attention here is on the network of institutions that carry out R/D&I activities per se rather than either the superordinate system that provides resources and constraints and accepts system outputs (i.e., the federal and to a lesser extent state agencies and private foundations) or the subordinate system of mostly sector-spanning organizations that provide support services (e.g., data processing service bureaus, equipment suppliers, maintenance firms, etc.).

1. Parallel Subsystems Within the R/D&I System

The structure of the educational R/D&I system is, in reality, a set of three parallel subsystems.

A. Colleges and Universities

One subsystem is made up of various organizational settings located within the colleges and universities -- schools, colleges, and departments of education; educational research bureaus; various academic departments in the social sciences and occasionally other disciplines as well; and university based interdisciplinary research centers and institutes.[3]

B. Quasi-Public and Private Sector Institutions

A second subsystem parallel to the first is made up of the large and proliferating number of quasi-public and private sector institutions currently engaged in educational R/D&I -- the federally funded regional laboratories, R&D centers, ERIC clearinghouses, materials centers, etc.; non-profit and for-profit research corporations geared to the federal grants and contracts economy; organizations from private industry that have been making tentative forays into educational R/D&I; and others such as publishers and audiovisual firms that have strong, established footholds in the education sector.[4]

C. SEAs, ISAs, and LEAs

The operating system of State Education Agencies (SEAs), Intermediate Service Agencies (ISAs), and Local Education Agencies (LEAs) are so weakly linked to these other two subsystems, and often so redundant with them in the conduct of R/D&I activities, that we have identified the operating system as a third, parallel stream rather than as the KU target of KP activities in these other two streams.[5]

D. Linkages Within Each Subsystem

Within each of these subsystems there is some interaction of a more or less informal nature -- but far less than one would imagine given the physical proximity of organizational units within the academic setting; or given the operating system's formal governance structure that would lead one to expect to find extensive interaction and monitoring between SEA and LEA personnel; or considering the commonality of interests that would lead one to expect extensive communication among schools or between LEAs and SEAs.

ISAs represent a new development aimed at increasing linkages among school districts, and between school districts and their SEAs. Aside from this one exception (and even here, only some states have created ISAs -- and these tend to be quite new), linkages within each of the three subsystems are incidental and informal rather than institutionalized, permanent, and strong. Consequently, communication and information flow are weak, and knowledge production and utilization are inefficient and far less effective than they might otherwise be. Developments in social science departments tend to have relatively little impact on developments in schools of education. R&D activities in one research corporation have little impact on R&D activities in others. As yet, local innovations in one school district seem to have little impact on practices in other districts.

E. Linkages Between Subsystems

Equally (and perhaps even more) serious are weaknesses in the linkages among these parallel subsystems. The academic community tends to function in relative isolation from both the operating system and the research corporations that dominate R&D activity. Consequently, the research findings produced by the universities have relatively limited impact outside that sybsystem. The operating system is linked to publishers and equipment suppliers in the private sector but otherwise generally develops its own programs and materials and tends more often than not to operate as though there were no educational research community, no relevant research findings, and no externally developed R&D products and programs.[6] The general pattern in the regional laboratories and the research corporations has been to develop products and programs in relative isolation from either the academic community and its accumulated knowledge base or the user system and its perceived needs and constraints. There are notable exceptions, of course, and some strong collaborative arrangements have been forged in a number of instances (e.g., Northwest Regional Laboratory in relation to school districts in its region). But on the whole, individual R/D&I institutions and organizational units tend to function in isolation, linked weakly if at all to other institutions or units or their immediate subsystem or other subsystems in the macrostructure.

2. Degrees of Functional Specialization or Clustering

A. A Low Degree of Functional Specialization

Given the range of institutional types involved in educational R/D&I activity, one might expect to find a "natural" specialization of functions and a pass-it-on flow of R/D&I activity in the relationship among these subsystems. The university subsystem would seem to be inherently suited to research. The non-university research corporations would seem to be designed to meet the needs of programmatic development work. And the operating system could be (and were for a time) viewed narrowly as the target to receive the outputs researched in the universities and developed in the corporations.

However, examination of the kinds of R/D&I activities carried out in these institutions suggests that there is some, but considerably less functional specialization than one might expect, and considerably less linkage, two-way-interaction, or knowledge feedback than one would expect to find in a mature, well integrated system.

The relatively limited degree of specialization and extensive amount of redundancy that characterize the educational R/D&I system can be seen in the location and clustering of R/D&I functions in the various institutions that make up the system. The greatest amount of specialization occurs at the basic research end of the educational KPU spectrum, with most basic research concentrated in the universities and especially in the academic departments. Some basic research is also done in some of the larger wealthier and more presigious research corporations (e.g., Educational Testing Service).[7]

Applied research, however, is carried out in one form or another in research institutions or units scattered throughout all the various types of organizational settings in the system -- the universities; the R&D centers and regional laboratories; the research corporations; and even some of the strong SEAs and big-city LEAs that have the resources to carry out policy research as part of their long-range planning and monitoring efforts.[8]

The bulk of federally funded development work is carried out in the regional laboratories and university-based R&D centers and the large research corporations. However, development work in one form or another takes place in virtually all types of organizational settings in all three subsystems.[9] Similarly, dissemination and evaluation contracts are being awarded increasingly to institutions located in only certain segments of the overall structure (dissemination contracts increasingly to SEAs and organizations working with them;

evaluation contracts increasingly to the research corporations. Noneth-less, dissemination and evaluation activities, too, are carried out in one form or another throughout the structure, even in organizational units within the superordinate structure of federal and state agencies.[10]

If we consider the implementation and utilization support functions, what little linkage specialization exists to provide user system personnel with technical assistance in building internal capabilities or implementing externally developed R&D products, tends to be located either in new linkage and technical assistance organizations (often small non-profit corporations) or in the hands of a small group of staffers from a laboratory, R&D center, or private-sector R&D organization that is trying to install one of its products. Still, even here, careful analysis uncovers some linkage, technical assistance, and implementation support activities in the universities, in some of the stronger SEAs, and in those few LEAs and individual schools that are well endowed with curriculum specialists and other specialized personnel.[11]

Overall, then, compared to some of the more mature R/D&I systems in other sectors that show very high levels of specialization of organizations by functions and subfunctions, functional specialization among educational R/D&I organizations tends to be somewhat limited. Still, regardless of how education may compare to other fiels, funding data suggest that there is a substantial amount of specialization and division of labor. After reviewing the available funding data, one group of analysts concluded that "each KPU function tends to be supported largely in one or two kinds of organizations, and each type of organization tends to receive a majority of its funds for only one or two functions."[12] LEAs receive virtually all of their KPU-related federal funding for demonstrations. For-profit corporations are largely dependent on evaluations. SEAs are heavily dependent on demonstration projects, but also receive significant sums for development work. Non-profit corporations receive substantial amounts of their federal education KPU-related funding for development work and for demonstrations. Academic institutions have the most diverse pattern, deriving their federal support for education KPU activities for development work, basic research, and pilot and demonstration projects or replications.[13]

What is intriguing about the lesser specialization of educational R/D&I compared to other sectors is not only that there is less functional specialization among organization but also that there appears to be even less specialization in substantive areas of R/D&I activity. Basic researchers tend to become specialists in narrowly defined research areas and subject of investigations. But this seems to be only rarely true in the case of the other functional areas. Our observations on this point were made several years ago, and some of this may have changed, but if the pattern still holds, the pattern in education may be that applied researchers, developers, evaluators, disseminators, and implementation support personnel tend more often than not to become generalists within their functions -- one year evaluating education programs; the next year examining the effectiveness of alternative dissemination strategies; the next year assessing the quality of ERIC information analysis products; etc. . Within a few months time, a single large R/D&I organization within the education sector may respond to RFPs and bid on and be awarded contracts covering the whole range of functional specialties and an array of topical areas; and some of the same personnel may be assigned to work on several of these rather different contracts at the same time. Some of these organizations may also be working on contracts involving R/D&I activities in fields of health, personnel development, social welfare programs, etc. Clearly, this pattern is at considerable variance from a sector like the aviation/aerospace industry where there is highly developed specialization by function, by components (e.g., airframes, engines, electronics), and even by R&D problem areas (e.g., wing stress analysis). It would seem useful to gather some data on this point, to assess the extent of specialization at present, and the extent to which this has or has not increased over the past decade, and the specific functional and substantive areas in which there is or is not a substantial degree of specialization.

B. <u>A High Degree of Functional Clustering</u>

Examination of the clustering of functions within R/D&I institutions reveals, not surprisingly, that basic research is the most specialized of the various functions and the least likely to cluster with any of the others. This is attributable to the nature of the knowledge and technology base of the basic research function; the socialization and training of its personnel; and the values, norms, and mores of the university settings in which it takes place. If we ignore basic research and consider the remaining R/D&I functions, we find several forms of both adjacent and looping clusters.

A significant amount of clustering surrounds the development function -- e.g., applied research and development; development and dissemination; development and production of support materials for implementation/utilization, and even development/dissemination/implementation clustering. The clustering is the outcome of conscious policy decisions of educational R/D&I managers. A less formalized version of the same kind of clustering (minus dissemination) would be represented by the creative teacher who generates an idea, gathers relevant information, develops it into a teaching strategy and instructional materials, and then uses them in her classroom.

Dissemination and implementation/utilization clustering is becoming increasingly frequent as a result of the knowledge base and personnel base that spans these two functions and as a result of the kinds of organizational arrangements that are being created by explicit and intentional policy initiatives of federal and state agencies (e.g., training programs for dissemination and utilization specialists; state creation of ISAs to provide dissemination and technical assistance services to school districts; NIE's R&D Utilization Program; etc.).

Applied research and evaluation were a natural cluster during the first few years of the emergence of the evaluation function, largely because evaluation personnel were trained as researchers; were interested in conducting research rather than evaluation; were forced into evaluation work by the operation of the laws of personnel supply and demand; and tended more often than not to piggyback research projects onto required evaluation activities. As evaluation has matured and developed an identity, methodology, and personnel base of its own, this basis for the research/evaluation cluster has been less prominent. Still, there are several examples of well-run R&D programs where questions uncovered in the course of product or program evaluations are turned over to research personnel for further investigation oriented toward future development cycles for further product refinement (e.g., in the development of the Individually Prescribed Instruction Program by the Learning Research and Development Center and by Research for Better Schools).

One of the newest clusterings to appear is a utilization/research cluster that may lead to maturation of a practice-oriented research specialty.

Also relatively new is a utilization/development/dissemination or utilization/dissemination cluster evident in projects to identify exemplary practices, document and analyze them, use them as the basis for materials development, and disseminate these practices and materials to other potential users. The configuration is changing somewhat as more and more resources are being allocated to building linkages. Initially, this took the form of temporary collaborative arrangements and joint ventures for individual projects, joining together institutions with complementary capabilities or functional specialties. Increasingly the consortia and networks that are being proposed and experimented with are intended to be permanent, formalized interface arrangements providing either horizontal integration (linking similar institutions or organizations) or vertical integration (linking functions and/or subsystems). It will be some time, however, before we can expect to see the effects of these initiatives on the configuration of educational R/D&I institutions.

3. A Final Point: The Place of Large Corporations

One further point should be noted before we leave the topic of the structure of the R/D&I system in education. Several large corporations appear to have particularly strong positions in the grants and contracts economy of the education sector -- e.g., the American Institutes of Research, Rand Corporation, Stanford Research Institute, and Education Testing Service. In fact, in the period FY 1973 - FY 1975, fewer than 50 organizations received the majority of NIE funding support.[14] Still, the number of R/D&I institutions receiving funds from all sources is substantial[15] and it would seem unwarranted at this time to suggest that certain types of R/D&I in the education sector are dominated by a few large institutions in a pattern resembling the aviation/aerospace industry. However, we will be in a better position to assess this question after the NIE KPU monitoring project provides empirical data about the individual institutions that carry out educational R/D&I activities -- essential information for understanding the emergent configuration of educational R/D&I institutions and for developing appropriate policy initiatives and strategies for macrostructure management.

III. NEEDED EMPIRICAL AND ANALYTICAL WORK

Several kinds of empirical and analytical work would seem to be needed to inform policy development aimed at strengthening the institutional base of educational R/D&I.

At the very least, we need to develop considerably more precise information than we have now about the types of capabilities required to carry out various kinds of R/D&I activity in education. We include here three levels of capabilities: personnel competencies, organization capabilities (that entail considerably more than simply the sum of the competencies of the personnel within an organization), and system capacities (which, likewise, involve more than simply the capabilities of the organizations that comprise the system's institutional base).

Both analytical and empirical work (in successive cycles) would seem to be called for to identify the various kinds of capabilities required. It would then seem essential to conduct surveys and other investigations to assess levels of capabilities for various kinds of educational R/D&I work and to identify and locate those institutions which currently appear to show evidence of high levels of particular capabilities and might, therefore serve as centers of excellence around which to strengthen and expand existing capacity.

In addition, more specific information would seem to be needed about existing linkages and information flows among the various institutions that carry out educational R/D&I work and/or use educational R/D&I outputs.

Beyond that, we need to better understand how certain types of institutional settings affect educational R/D&I functioning. We would want to see a series of process analyses carried out to explore and document the various organizational factors that facilitate or hinder high quality R/D&I functioning of different types in different types of organizational settings. Is it true, as is generally assumed, that basic research is best carried out in academic institutions? that development work is best carried out in R&D centers, laboratories, or research corporations? that evaluation work is best done by for-profit corporations? If these assumptions are true, why are they true? What organizational constraints work against equally high quality basic research functioning in non-academic settings, or equally high quality development work in academic institutions? And so on. We would want to develop an understanding of how key organizational variables impinge on R/D&I processes. And, we would want to get a handle on the question of whether or not certain types of institutions are best suited to certain types of R/D&I functioning. Are the first-rate performers of evaluation research, for instance, distributed across all organizational types, or are they virtually all located within only one type of institutional setting? Are the costs of a given type of R/D&I activity greater in one type of organizational setting than another, and if so, why? Are there ways to judge the cost-effectiveness of different institutional settings for different kinds of educational R/D&I activity? In short, to what extent can (or should) the educational R/D&I institutional base be understood in terms of functional specialization by organizational types? To what extent is this concept unrealistic or even inappropriate to the educational context?

Our "system-oriented" perspective suggests the need for NIE and other key sponsors of educational R/D&I activity to develop some clear notions about the kinds of capabilities and linkages that have to be nurtured and developed to permit the system to perform effectively in the future in carrying out the types of R/D&I

activities projected as needed. Policy initiatives should take into account these visions of the future of educational R/D&I. However, we acknowledge the validity of the key point made by the proponents of the configurational perspective. We have consistently argued for policy development that takes into account not only <u>generic</u> notions about how mature R/D&I systems function but also <u>contextual</u> perspectives that orient policymakers toward what is feasible and desirable at a given point in time in a particular context such as educational R/D&I -- taking into account, therefore, the interests of diverse educational R/D&I performer organizations as they define these interests. Before we can devise sound policies that take into account both generic and contextual factors, though, we will need to develop a sound empirical base on how R/D&I processes are affected by different types of organizational settings within the educational R/D&I institutional base.

A good place to start might be using data gathered in the recently completed organizational survey undertaken as part of NIE's Educational KPU Monitoring Program. These data might be used to develop sampling frames on different <u>types</u> of organizations carrying out significant amount of different <u>types</u> of educational R/D&I activity. Exploratory process analyses and documentation efforts might be started in several of these organizational types, with more elaborate work following at some later time when some of the initial conceptual and methodological issues have been resolved. But regardless of where work on these questions begins, they would certainly appear to warrant priority attention if we are to be able to build strong system capacities for high quality educational R/D&I functioning.

1. Egon G. Guba and David L. Clark, The Configurational Perspective: A Challenge to the Systems View of Educational Knowledge Production and Utilization (Bloomington: School of Education, University of Indiana, 1974); also Egon G.Guba and David L. Clark, "The Configurational Perspective: A New View of Educational Knowledge Production and Utilization," Educational Researcher, Vol. 4, No. 4, April 1975.

2. David K. Cohen, Ideas and Action: Social Science and Craft in Educational Practice (Cambridge: Harvard University Graduate School of Education, 1977), Unpublished Draft.

3. See, for instance: Paul F. Lazarsfeld, The Organization of Educational Research in the United States (New York: Bureau of Applied Social Research, Columbia University, 1966), Cooperative Research Project #1974, ERIC ED 010 276; Sam D. Sieber, "Existing Organizational Patterns in Educational Research," in The Training and Nurture of Educational Researchers, Egon G. Guba and Stanley Elam, eds., (Bloomington, Ind: Phi Delta Kappa, 1965); Rex Stockton, "University-Based Specialized Research Units: A Perspective," Journal of Research and Development in Education, Vol. 5, No. 4, Summer 1972; Robert E. Taylor and Jerry P. Walker, "Problems and Potentials of Managing Large-Scale Multidisciplinary R&D in a University Setting," Journal of Research and Development in Education, Vol. 5, No. 4, Summer 1972; Sam D. Sieber, Reforming the University: The Role of the Social Research Center (New York: Praeger, 1972); and Kenneth W. Heathington, Jo Lynn Cunningham, and Ray A. Mundy, "Management of Interdisciplinary Research in Universities: The State of the Art," Educational Researcher, Vol. 7, No. 1, January 1978. Also see the papers produced by the Indiana University Project entitled "A Futures Analysis of Teacher Education Institutions," headed by David Clark and Egon Guba, published in 1976 and 1977 at the RITE (Research on Institutions of Teacher Education) Occasional Papers series: An Institutional Self-Report on Knowledge Production and Utilization Activities in Schools, Colleges, and Departments of Education; Studies of Productivity in Knowledge Production and Utilization by Schools, Colleges, and Departments of Education; Contemporary Scenarios of Knowledge Production and and Utilization in Schools, Colleges and Departments of Education; Contextual Factors Affecting Individual and Institutional Behavior in Schools, Colleges, and Departments of Education; Likely Near-Future Scenarios for Schools, Colleges, and Departments of Education; and Alternative Futures for Schools, Colleges and Departments of Education.

4. There is a large literature on the regional laboratories, R&D centers, and other institutions created by OE in the 1960s. Much of this literature is referenced in our Chapter on the historical development of the educational R/D&I system, and we refer the reader to that chapter for more extensive citations. For illustrative purposes here, we cite the following: Office of Education, Educational Research and Development in the United States (Washington:

OE, 1969); National Institute of Education, 1976 Databook: The Status of Education Research and Development in the United States (Washington: NIE, 1976); Francis S. Chase, The National Program of Educational Laboratories (Washington: OE, 1968); N. J. Boyan and W. S. Mason, "Perspectives on Educational R&D Centers," Journal on Research and Development in Education, Vol. 1, 1968; Stephen K. Bailey, "Emergence of the Laboratory Program," Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970; Stephen K. Bailey, "A Final Report from the National Advisory Committee on Educational Laboratories," Educational Researcher (Newsletter), Vol. 21, September 1970; John D. Herzog, "The Productivity of Undermanaged Research: Five Years of the Harvard R&D Center," Journal of Research and Development in Education, Vol. 5 No. 4, Summer 1972; J. Victor Baldridge and Rudolph Johnson, The Impact of Educational R&D Centers and Laboratories: An Analysis of Effective Organizational Strategies (Stanford: National Academy of Education, 1972), ERIC ED 079 860; Roald Campbell et al., R&D Funding Policies of the National Institute of Education: Review and Recommendations (Washington: NIE, 1975); and Panel for the Review of Laboratory and Center Operations, Research and Development Centers and Regional Educational Laboratories: Strengthening and Stabilizing a National Resource (Washington: NIE, 1979).

On the private sector, see for instance: Paul Goodman, Gerald Holton, Donald W. Oliver, G. Howard Goold, and Edward Katzenbach, "The Education Industries: A Discussion," Harvard Educational Review, Vol. 37, No. 1, Winter 1967; Nancy A. Bord et al., Study of the Education Products Industries, New York, Institute for Educational Development, as cited in OE, Educational Research and Development in the United States, op. cit., pp. 169-70; and William A. Firestone, "Educational Field Research in a 'Contract Shop'," The Generator (Division G AERA Newsletter), Vol. 5, No. 3, Spring 1975.

5. On SEAs, for instance, see: Henry M. Brickell, Survey of State Education Department Research, Development, Demonstration, Dissemination, and Evaluation RDDDE, 1969-70 (New York: Institute for Educational Development, 1971), ERIC ED 078 548; Jerome T. Murphy, "Title V of ESEA: The Impact of Discretionary Funds on State Education Bureaucracies," Harvard Educational Review, Vol. 43, No. 3, August 1973; Jerome T. Murphy, Grease the Squeaky Wheel: A Report on the Implementation of Title V of the Elementary and Secondary Education Act of 1965, "Grants to Strengthen State Departments of Education" (Cambridge: Center for Education Policy Research, Harvard University, 1973); and Sally Bulkley Pancrazio, "State Education Agencies as Research Arenas," Educational Researcher, Vol. 7, No. 1, January 1978.

On LEAs, see, for instance: David G. Ryans, "Are Educational Research Offices Conducting Research?" Journal of Educational Research, Vol. 51, November 1957; National Education Association, "Research Units in Local School Systems," Educational Research Service Circular, 1965, No. 5; and Edith K. Mosher, What About the

School Research Office? (Berkeley: Far West Laboratory for Educational Research and Development, 1969).

6. See, for instance, Robert Travers, "A Study of the Relationship of Psychological Research to Educational Practice," in Training for Research and Education, R. Glaser, ed. (Pittsburgh: University of Pittsburgh Press, 1962); J. Lindeman, S. K. Bailey, J. S. Berke, and L. H. Naum, Some Aspects of Educational Research and Development in the United States - Report for the OECD Review (Syracuse: Syracuse University Research Corporation, 1968); Ronald Havelock and Mary Havelock, Educational Innovation in the United States (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Survey Research, University of Michigan, 1973); and Ronald G. Havelock, "Locals Say Innovation is Local: A National Survey of School Superintendents," in What Do Research Findings Say About Getting Innovations Into Schools: A Symposium, Sanford Temkin and Mary V. Brown, eds., (Philadelphia: Research for Better Schools, 1974).

7. The best available data on federal funding of educational R/D&I by performing organizations is limited to data on projects in early childhood and adolescent education. (See our chapter on Funding for a description of this "SRG" data base, and its limitations.) According to these data (which are also the basis for the information provided below in footnotes 7-10 and 12), 71% of federal education KPU funds in F& 1975 went to academic institutions, 14% to non-profit corporations, and 4% to for-profit corporations. Carnot E. Nelson and Ward S. Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency (Washington: NIE, 1977), Table 15, p. 33.

8. Ibid. Applied research funding in F& 1975 was distributed as follows: 34% to academic institutions, 29% to non-profit corporations, 4% to SEAs, 10% to LEAs, 14% to other state and local agencies, less than 0.5% to for-profit corporations and 8% to "other" types of organizations.

9. Ibid. Development funding in FY 1975 was distributed as follows: 38% to non-profit corporations, 33% to academic institutions, 2% to for-profit corporations, 11% to SEAs, 4% to LEAs, 4% to other state and local agencies, and 8% to "other" types of organizations.

10. Ibid. The figures on "pilot or demonstration projects and replications" are as follows: 66% to LEAs, 8% to academic institutions, 8% to non-profit corporations, less than 9.5% to for-profit corporations, 8% to SEAs, 3% to other state and local agencies, and 7% to "other" organizations.

The figures for "research support and utilization" (which includes, but is not limited to dissemination) are: 24% to academic institutions, 52% to non-profit corporations, 8% to for-profit corporations, 10% to SEAs, less than 0.5% to LEAs, 1% to other state and local agencies, and 5% to "other" organizations.

The figures for evaluation research are: 21% to academic institutions, 27% to non-profit corporations, 49% to for-profit corporations, less than 0.5% to SEAs, 0 to LEAs, 1% to other state and local agencies and 2% to other organizations. The figures for policy research (an R/D&I activity we have tended to collapse into a single category with evaluation research) are: 11% to academic institutions, 34% to non-profit corporations, 20% to for-profit corporations, 2% to SEAs, 17% to LEAs, 12% to other state and local agencies, and 5% to "other" organizations.

11. Implementation/Utilization can be viewed here as a subcategory of "Research Support and Utilization." For the figures on this, see above, footnote 9.

12. Nelson and Mason, Project Content and Performer, By Agency, op. cit.

13. Ibid. The figures on this for federal funding of education KPU-relevant activity are as follows: 97% of LEA funds are for demonstrations; 77% of the funding going to for-profit corporations is for evaluations; 67% of SEA funds are for demonstration projects and another 27% for development work; for non-profit corporations, the funding is received largely for development work (38%) or demonstrations (28%), the funds going to academic institutions are for basic research (22%), development work (30%), and pilot and demonstration projects or replications (27%).

14. NIE, 1976 Databook, op. cit.

15. The non-profit corporations and (to a lesser extent) the universities seem particularly favored in the NIE funding, but this may be balanced by predominant orientations toward other institutional types by other federal agencies (for instance, OE funding vafors LEAs, Public Health Service funding favors the universities). See Nelson and Mason, Project Content and Performer, By Agency, op. cit.

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER FIVE

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CHAPTER FIVE

PERSONNEL BASE

CONTENTS

The personnel base of educational R/D&I appears to be one of its most critical weaknesses and one that is central to many of the problems faced by the field. Without an adequate supply of first-rate talent, the field has been unable to produce impressive outputs or develop the kind of high quality knowledge and technology base that would seem to be essential if significant achievements are to be made in the future. Criticisms of the personnel base have been made from the outset of the institutionalized system's history[1] (and even in the discussions that led to its creation[2]), and the criticisms remain today.

Yet despite this unhappy situation, there have been relatively few significant initiatives to strengthen the personnel base of the field.[3] And even more remarkable, our knowledge about this personnel base has advanced little over the past decade or so. Until NIE undertook its KPU Monitoring Program organizational survey a couple of years ago, we were still at the rather rudimentary level of simply trying to estimate the numbers of people we are talking about. Only now are we beginning to get hard data on numbers of personnel carrying out R/D&I functions in various kinds of organizations active in the education sector.[4] Most descriptive information about the field's personnel base was produced in the mid-'60s[5] and described the situation before it was changed somewhat dramatically by the transition to organized R/D&I as the dominant mode of functioning (and therefore the requisite skills and competencies) has been commented on in some insightful articles in recent years.[6] However, there has been almost no empirical study of these new modes of functioning[7] or their implications for policy requirements to strengthen the field's personnel base.

I. DEFINITION OF PERSONNEL BASE OF EDUCATIONAL R/D&I

To avoid confusion, a definition of who we are talking about in this chapter would seem to be in order. The personnel base of the education operating system in this country is comprised of well over three million education professionals.[8] However, relatively few of these instructional and administrative personnel who staff the operating system carry out significant amounts of R/D&I activity, and fewer still carry out R/D&I roles as institutionalized specialities.

The personnel of concern to us here in this chapter are those who play specialized roles in research, development, dissemination, implementation/utilization support or other linkage activities, evaluation or policy research. We recognize the considerable amount of internal innovation and practice-based development work that go on within the operating system, by teachers, administrators, and others who have not been assigned specialized R/D&I roles. We shall discuss this practice-based innovation in several other chapters -- for instance, those on development, dissemination, implementation/utilization, information flows, and outputs. We acknowledge, too, that much needs to be known about how these operating system personnel carry out these roles more effectively. However, in this chapter, we have restricted our attention to the personnel who carry out institutionalized roles in educational R/D&I, and this should be clear at the outset.

II. THE AVAILABLE LITERATURE

The relevant literature is not small. Yet we know relatively little about the specialized personnel base of educational R/D&I.

For convenience, the available literature can be categorized in terms of several concerns. Some pieces fall wholly under one heading; others touch on more than one concern. The various concerns that can be used to categorize the literature are as follows:

1. commentary on the generally mediocre quality of the field's personnel base;[9]

2. quantitative estimates of the numbers of personnel presently carrying out educational R/D&I roles and projections of the numbers of such personnel likely to be needed at various points in the future;[10]

3. analyses of the personnel base in terms of productivity criteria (e.g., quantity of output per R/D&I professional);[11]

4. analyses of the distribution of the R/D&I personnel base across functional specialties (e.g., numbers of researchers, developers, dissemination specialists, etc.);[12]

5. analyses of the distribution of the R/D&I personnel base across organizational settings (e.g., numbers employed in academic institutions, in LEAs, in SEAs, in non-profit research corporations, etc);[13]

6. examinations of the professional backgrounds and career lines of educational R/D&I personnel (e.g., disciplines in which they were trained, work experience, career lines, professional orientation, etc.);[14]

7. analyses of demographic data on educational R/D&I personnel (age, sex, education, minority status, etc.);[15]

8. analyses of the organizational settings in which R/D&I is carried out and the implications of these settings for the kinds of competencies and patterns of functioning demanded of personnel;[16]

9. analyses of the competencies (knowledge, skills, and sensitivities) required to carry out various R/D&I specialties and consideration of the implications for training programs or for such possibilities as certification of R/D&I personnel;[17]

10. descriptions and/or assessments of training programs and other initiatives that have been undertaken to upgrade the personnel base of the field;[18]

11. descriptions of models for new training programs;[19] and

12. discussions of various options that might be pursued to strengthen the personnel base of the field.[20]

Based on this literature, several summary statements seem justified as to both the progress that has been made over the past decade or so and the continuing sources of weakness in the field's personnel base.

III. EXPANSION OF THE PERSONNEL BASE

The specialized educational R/D&I personnel base has undergone substantial expansion in the past decade or so. In comparison to the mid-'60s, the educational R/D&I personnel base has doubled (perhaps tripled). The best estimate was that the R/D&I system personnel base in 1964 totalled about 4,000 persons.[21] In 1974, several estimates suggest a mean figure of about 10,000 persons (estimates ranged from 8-12,000, and higher or lower estimates can be found, depending on one's definition of an educational R/D&I system).[22]

Clearly, then, considerable development of the personnel base is evidenced in terms of sheer numbers. However, it is not entirely clear at this time whether the overall quality of the personnel in the field has improved. In some fields, such as basic research, there has been some concern that funding expanded more rapidly than what could be absorbed productively by the existing high quality base of researchers, attracting substantial numbers of researchers with less impressive credentials than those who had previously dominated federal research funding. (We consider this point further in our chapters on research and funding.)

IV. CRITICAL WEAKNESSES IN THE PERSONNEL BASES

Despite whatever gains have been made over the past decade and a half, the literature suggests that the educational R/D&I personnel base is still inadequate in sheer numbers.[23] In addition, several other factors suggest that the personnel base may be the system's most critical point of weakness, and the most difficult to overcome.

1. Functional Imbalance

Although we will be in a much stronger position to arrive at judgments on these questions when the data from NIE's Education KPU Monitoring Program organizational survey become available, existing data suggests that the educational R/D&I personnel base is disproportionately concentrated in research, evaluation research and development;[24] is critically sparse in dissemination; and almost totally absent in functional specialties that are just emerging or have yet to emerge (e.g., need identification, acquisition, and implementation/utilization support).

2. Inadequate Supply of Trained R/D&I Managers

It also appears that the field suffers particularly from the lack of an adequate supply of trained or experienced R/D&I managers, or even an appreciation of R/D&I management as a function that could benefit from specialized skills and training.[25]

3. Backgrounds and Training

By training and professional background, educational R/D&I personnel tend to come out of either the psychology/sociology statistical research tradition and the university environment[26] or out of school system positions (e.g., teachers or administrators).

With few if any training programs geared to producing R/D&I specialists (and the few that have been available geared more to the pattern of academic project research rather than programmatic development), on-the-job training has been the primary mechanism for producing personnel with appropriate skills and competencies -- an inefficient strategy at best. Some initiatives have been taken to develop training programs more suitable to the needs of educational R/D&I functioning.[27] But as yet, it is too early to detect a significant change in the character of the system's personnel base.

V. SOME SEEMINGLY INTRACTABLE PROBLEMS

The recruitment, training, and socialization of a talented personnel base for educational R/D&I will require overcoming several seemingly intractable problems; for example:

1. the low prestige of education, educational research, and educational R/D&I;

2. the orientations of most of those who come out of university settings toward advancing theory rather than improving practice; toward individualistic rather than team functioning; toward relatively homogeneous rather than heterogeneous personnel skill mixes; toward producing publications rather than products or programs; toward a professional rather than a bureaucratic style of functioning and management;

3. the complexities of developing suitable training programs, given the ambiguity that surrounds the definition of work roles, requisite skills and standards for various functional specialties in the field and the weakness of the existing knowledge base;

4. the instability of R/D&I funding; and

5. the insecurity of R/D&I positions compared to tenured university posts.

VI. POLICY ISSUES

1. Rates at which the Personnel Base Can Be expanded for Different Functions.

Our knowledge of other R/D&I systems suggests that the rate at which the personnel base can be expanded varies among R/D&I system functions. In research (and to a lesser extent, development), the rate is dependent on the number and size of the existing centers of excellence (which alone can provide the training) and is a long term process. For the linkage functions (dissemination and to a lesser extent development), training programs can be developed at relatively modest levels of funding and personnel trained within a relatively short time frame. However, training in these functions will be constrained by (1) rates and levels at which users can reasonably absorb their outputs and (2) the relative lack of codification in the knowledge/technology Bases. Thus, merely investing dollars in training is not always wise or effective.

2. Attracting First-Rate Personnel

There has been much criticism of educational R/D&I for its failure to attract eminent researchers and first-rate younger talent from the disciplines. But is it possible to attract talented personnel to educational R/D&I, given the present poor quality of system outputs and the resultant inability to overcome the system's low prestige? Is it reasonable to try to intervene now in the maturation of the system's personnel base? Or, is it wiser to concentrate resources on a few key projects where the critical mass of talent already exists and impressive levels of achievement are within reach? Will a few exciting high quality R/D&I outputs do more to attract talented personnel than resource-building strategies focused on recruitment and training?

High level debate on these questions would seem to be in order, leading, one would hope, to long-range planning of interrelated product development and resource-building strategies to speed system maturation.

1. For instance, see comments in: Daniel E. Griffiths, Research in Educational Administration: An Appraisal and a Plan (New York: Teachers College, Columbia University, 1959; Nicholas A. Fattu, "The Role of Research in Education -- Present and Future," Review of Educational Research, Vol. 30, No. 5, December 1960, pp 409-421; Robert Barger, Egon Guba, and Corahann Okorodudu, Development of a National Register of Educational Researchers, Cooperative Research Project No. E-014 (Columbus, Ohio: The Ohio State University Research Foundation, 1965); Paul F. Lazarsfeld and Sam D. Sieber, Organizing Educational Research (Englewood Cliffs: Prentice-Hall, 1964); Sam D. Sieber and Paul Lazarsfeld, The Organization of Educational Research in the United States. Cooperative Research Project No. 1974 (New York: Bureau of Applied Social Research, Columbia University, 1966); Guy T. Buswell, T. R. McConnell, Ann M. Heiss, and Dorothy M. Knoel, Training for Educational Research, Cooperative Research Project No. 51074 (Berkeley: Center for the Study of Higher Education, University of California, 1966); Egon G. Guba and Stanley Elam, eds., The Training and Nurture of Educational Researchers, Sixth Annual Phi Delta Kappa, 1965); and see discussions of how the personnel base of the field was viewed at the time; as described in Richard Dershimir, The Federal Government and Educational R&D (Lexington, Massachusetts: Lexington Books, 1976). For samples of continuing criticisms of the personnel base of the bield over the next five years or so, see: David L. Clark and John E. Hopkins, A Report on Educational Research, Development, and Diffusion Manpower, 1964-1974 (Blomington: Indian University Research Foundation, 1969); Lee J. Cronbach and Patrick Suppers, eds, Research for Tomorrow's Schools: Disciplined Inquiry for Education (New York: Macmillan, 1969); Ronald G. Corwin and Maynard Seider, "Patterns of Educational Research: Reflections on Some General Issues," in The Educational Research Community: Its Communication and Social Structure, Richard Dershimir, ed. (Washington: American Educational Research Association, 1970), ERIC ED 057 275; Alfred Yates, ed., The Role of Research in Educational Change (Palo Alto: Pacific Books, 1971); and Carolyn Persell, The Quality of Research on Education: An Empirical Study of Researchers and Their Work (New York: Bureau of Applied Social Research, Columbia University, 1971). For an even more current version of the same critique, see: Roald F. Campbell et al., R&D Funding Policies of the National Institute of Education: Review and Recommendations (Washington: NIE, 1975).

2. For instance, see the description of the 1964 Gardner Task Force view of this, in Dershimir, The Federal Government and Educational R&D, op. cit.

3. There have been a few notable exceptions to this, such as: the Graduate Research Training Program and the grants made with the assistance of the Committee on Basic Research in Education of the National Academy of Sciences- National Research Council. However, both of these programs and most federal support for research training programs ended in the late 1960's. We shall consider these matters later in the chapter. One other exception here is the creation of the National Academy of Education comprised of eminent leaders of the field, and this organization is still functioning.

4. At the time this chapter was drafted, we had not yet seen the findings from NIE's Education KPU Monitoring Program organizational survey carried out by the Bureau of Social Science Research Inc. However, by the time this volume is published, these data should be available to the field.

5. For instance: Barger, Guba, and Okorodudu, Development of a National Register of Educational Researchers, op. cit.; Buswell, McConnell, Heiss, and Knoel, Training for Educational Research, op. cit.; Guba and Elam, The Training and Nurture of Educational Researchers, op. cit.

6. For instance, Ronald G. Corwin, Beyond Bureaucracy in Educational Research Management, in The Generator (Division G AERA Newsletter), Vol. 5, No. 2, Winter 1975; and William A. Firestone, "Educational Field Research in a 'Contract Shop,'". The Generator (Division G AERA Newsletter), Vol. 5, No. 3, Spring 1975.

7. One notable exception here are The Oregon Studies in Research, Development, Diffusion and Evaluation (Manmouth, Oregon: Teachings Research Division, Oregon State System of Higher Education, 1972). The Study director was H. Del Schalock. Volume IV presents twenty case studies of R/D&I functioning. The findings are summarized in Volume I.

8. National Institute of Education, The Status of Education Research and Development in the United States: 1976 Databook (Washington: NIE, 1976).

9. These sources include the references cited above in footnote 1.

10. NIE, 1976 Databook, op. cit.; Phi Delta kappa, National Register of Educational Researchers (Bloomington, Indiana: PDIC, 1966); Clark and Hopkins, A Report on Educational Research, Development, and Diffusion Manpower, op. cit.; and John F.

Hopkins, An Updating of the Clark-Hopkins Manpower Projections: AERA Task Force Technical Paper No. 25 (Washington: AERA, 1971).

11. Barger et al., Development of a National Register of Educational Researchers, op. cit., and Cronback and Suppes, Research for Tomorrow's Schools, op. cit.

12. NIE, 1976 Databook, op. cit.; Clark and Hopkins, A Report on Educational Research, Development, and Diffusion Manpower, op. cit.; and Hopkins, An Updating of the Clark-Hopkins Manpower Projections.

13. Ibid.

14. Ibid.; Egon G. Guba, The Place of Educational Research in Educational Change, as reprinted in The Oregon Studies, op. cit., Vol. II; B. R. Worthen and M. L. Byers, An Exploratory Study of Selected Variables Related to the Training and Careers of Educational Research and Research-Related Personnel (Washington: AERA, 1970); B. R. Worthen, R. D. Anderson, and M. L. Byers, A Study of Selected Factors Related to the training of Researchers, Developers, Diffusers, and Evaluators in Education (Washington: AERA, 1971); John E. Hopkins and Blame R. Worthen, An Analysis of Characteristics of 1969-70 Trainees in Title IV Graduate Research Training Programs and a Comparison with Siebers Study of 1966-67 Trainees (Washington: AERA, 1970); Bernard J. Fleury, Jr., Ermma M. Cappelluzzo, and W. C. Wolf, Jr., "Demographic Data for Trainers of Educational Researchers," Educational Researcher (Newsletter), Vol. 21, April 1970; Blaine R. Worthen and John E. Hopkins, "A Commentary on the Quality of Trainees in Title IV Graduate Research Training Programs," Educational Researcher (Newsletter), Vol. 22 (June 1971), pp. 3-4. See especially demographic data on AERA members published annually in the Educational Researcher, such as Arliss L. Roaden and Blaine R. Worthen, "A Profile of AERA Members as Researchers," Educational Researcher (Newsletter), Vol. 21, October 1970; and Joe A. Johnston, "AERA Members: A Profile, 1969;" Educational Researcher (Newsletter), Vol. 21, December 1970.

15. Ibid.

16. Of particular value here are The Oregon Studies, op. cit., especially Volumes I and IV; and Corwin, "Beyond Bureaucracy in Educational Research Management," op. cit.

17. See especially Schalock, Thomas, Morse, Smith and Arrinersman, The Oregon Studies, Vol. I., op. cit.; H. Del Schalnck and G. Roger Sell, "A Framework for the Analysis and Empirical Investigation of Educational R, D, D and E," in The Oregon Studies, Vol. III, op.cit. B. R. Worthen and R. M. Gagne, The Development of a Classification

System for Functions and Skills Required of Research and Research-Related Personnel in Education, Technical Paper No. 1 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1969), B. R. Worthen and J. R. Sanders, The Development of an Interview Technique to Collect Data on Importance and Availability of Selected Competencies in Research, Development, Diffusion, and Evaluation (Boulder, Colorado: Laboratory of Educational Research, University of Colorado, 1970); J. R. Sanders and B. R. Worthen, An Analysis of Employers' Perceptions of the Relative Importance of Selected Research and Research-Related Competencies and Shortages of Personnel with Such Competencies (Boulder, Colorado: Laboratory of Educational Research, University of Colorado, 1970); G.V. Glass and B. R. Worthen, Interrelationship Among Research and Research-Related Roles in Education: A Conceptual Framework, Technical Paper No. 4 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1970); G. V. Glass and B. R. Worthen, Essential Knowledge and Skills for Educational Research and Evaluation, Technical Paper #5 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1970); A. R. Coller, A Taxonomy of Programmatic Tasks in an Educational Evaluation Facilitation and Coordination System, (Northfield, Illinois: Cooperative Educational Research Laboratory, Inc., 1970 (USOE Contract OEC-3-3061391 - 3061); R. D. Anderson, J. M. Soptick, W. T. Rogers, and B. R. Worthen, An Analysis and Interpretation of Tasks and Competencies Required of Personnel Conducting Exemplary Research and Research-Related Activities in Education Technical Paper #23 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1971); B. R. Worthen, Some Tasks and Competencies Frequently Required in Educational Research and Evaluation, Research, Evaluation and Development Paper No. 5 (Portland, Oregon: Northwest Regional Educational Laboratory, 1974); B. R. Worthen, "Competencies for Educational Research and Evaluation," Educational Researcher, Vol. 4, No. 1, January 1975; and Robert M. Gagne, "Qualifications of Professionals in Educational R&D," Educational Researcher, Vol. 4, No. 2, February, 1975.

18. For instance, Guba and Elam, eds., The Training and Nurture of Educational Researchers, op. cit.; Buswell et al., Training for Educational Research, op. cit.; Sam D. Sieber, Analysis of USOE Research Training Programs, 1966-67 (New York: Bureau of Applied Social Research, 1968); B. R. Worthen, The Impact of Research Assistantship Experience on Subsequent Development of Educational Researchers, Unpublished Dissertation, Columbus, Ohio: Evaluation Center, Ohio State University, 1968); B. R. Worthen and W. J. Popham, Research Training Activities Stimulated by the AERA Task Force on Research Training 1969-70 (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1970); J. R. Sanders and G. E. Hanna, A Survey of Training Programs of Selected Professional Associations (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1970); Ken Walker, "The Future of USOE's Research Training Program?" Educational Researcher (Newsletter), Vol. 21, April 1970; B. J. Fleury, E. M.

Cappelluzzo, and W. C. Wolf, Education Research Training Programs: Requirements for Admission (Amherst: University of Mass., 1969), Mimeo; Gary Hanna, "Research Training: New Programs Emerging," Educational Researcher (Newsletter), Vol. 21, May 1970; Eric R. Rudi, "New Graduate Programs and Structures with Specific Emphasis on Institutes and Centers," Journal of Research and Development in Education, Vol. 5, No. 4, Summer 1972; W. James Popham, "Getting in Training: A Decade of AERA's Efforts to Prevent Professional Obsolescence," Educational Researcher, Vol. 3, No. 4, April 1974; William J. Russell, "AERA's Research Training Program: Reaching Out," Educational Researcher, Vol. 4, No. 11, December 1975; and Phi Delta Kappa, Evaluation Training Catalogue (Bloomington, Ind.: PDK, 1975). There have been other sorts of initiatives to strengthen the personnel base, notably the COBRE effort to attract basic researchers from the disciplines, as described in: John B. Carroll and Patrick Suppes, "The Committee on Basic Research in Education: A Four-Year Tryout of Basic Science Funding Procedures," Educational Researcher, Vol. 3, No. 2, February 1974; COBRE, Final Report of the Committee on Basic Research in Education (Washington: National Academy of Sciences - National Research Council, 1972); and Cameron Fincher, "COBRE and the Dilemmas of Basic Research in Education," Educational Researcher, Vol. 3, No. 2, February 1974.

19. For instance, see: D. L. Stufflebeam Proposal to Design New Patterns for Training Research, Development, Demonstration/Dissemination and Evaluation Personnel in Education (Washington: DHEW, 1970); Paul Hood, Final Report of a Design of a Survey for Determining Training and Personnel Requirements for Educational Research, Development, Dissemination and Evaluation, 2 Volumes (Berkeley: Far West Laboratory for Educational Research, Development, Dissemination and Evaluation, 1972); Richard A. Dershimer, W. James Popham, and William J. Russell, Development of Training Models for Educational Research: A Conceptual Scheme for a Professional Association (Washington: AERA, 1973); A. Jwaideh and J. Knowlton, Proposal for a Two-Year Fellowship Program to Train Educational Diffusion Specialists (Bloomington, Ind.: Audio-Visual Center, Indiana University, 1970), mimeo; W. L. Goodwin and B. R. Worthen, Design Specifications for the Development of Simulation Materials for Training Educational Researchers (Boulder, Colo.: AERA Task Force on Research Training, Laboratory of Educational Research, University of Colorado, 1970); W. James Popham, Final Report. Development of a Pilot Library of Cassette Tapes Dealing With Recent Advances in Strategies and Features Of Educational Research (Washington: USOE Project No. 00729, 1971). Note also that the Oregon Studies volumes were initially put together with some thought of providing basic materials for new training programs.

20. See for instance: Cronback and Suppes, Research for Tomorrow's Schools, op. cit; and Richard E. Schutz, "Now is the Future for R&D Training in Education," Educational Researcher, Vol. 2, No. 5, May 1973.

21. For instance, see Roald F. Campbell et al., R&D Funding Policies of the National Institute of Education: Review and Recommendations (Washington: NIE, 1975); NIE, 1976 Databook, op. cit.

22. NIE, 1976 Databook, op. cit.

23. See The Oregon Studies, op. cit, Vol. I.

24. NIE, 1976 Databook, op. cit.

25. For instance, see the references cited above in footnote 19.

26. Ronald G. Corwin and Saad Z. Nagi, "The Case of Educational Research," in The Social Contexts of Research, Saad Z. Nagi and Ronald G. Corwin, eds. (New York: Wiley, 1972).

27. This viewpoint is suggested at one point in Marc Tucker, Mary Harahan, Berlin Kelly, Ward Mason, and Saul Yanofsky, Building Capacity for Renewal and Reform: An Initial Report on Knowledge Production and Utilization in Education (Washington: NIE, 1973).

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EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER SIX

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CHAPTER SIX

FUNDING

CONTENTS

Page

Page

Page

Page

TABLES

TABLES (Continued)

FIGURES

Of all the aspects of R/D&I we consider in our analytical framework, the one that probably most significantly impacts and determines the shape of all others is funding. It largely determines what R/D&I activities will (and will not) be carried out and by whom. Indirectly, it thereby shapes what R/D&I functions will be developed, what sorts of institutional and personnel bases will be strengthened, what sorts of capacities will be developed (and where).

Despite the obvious policy significance of data on these basic descriptive sorts of matters, until recently there has been little solid information about how educational R/D&I funding is distributed across functions, performer institutions, activities, etc. Over the past few years, there has been a considerable amount of analytical effort focused on these matters. Although there are still substantial gaps in what is known, we have far more understanding of this now than only a few short years ago. In addition, some key issues of funding policies have been tackled and discussed in the literature, reflecting several of the critical funding concerns debated in the field. We shall attempt to review and assess much of this here.

Our analysis in this chapter is presented in five sections. First, we provide a broad overview of the literature, describing the kinds of discussions of educational R/D&I funding that are available. Second, we take note of the various types of problems in educational R/D&I funding that are discussed in the literature. In a third section, we summarize the findings of various analyses of the distribution of educational R/D&I across funding sources, functions, performing institutions, activities, etc. We also consider funding data that may soon be available from NIE's KPU Monitoring Program. We then turn to a number of significant funding policy issues that have been debated in recent years, examine various options that have been considered, and speculate about contextual factors that may have influenced the courses of action taken. Finally, we identify a number of funding policy issues in need of exploration and suggest the kinds of data and analyses that seem to be called for to provide a sound basis for policy debate on such issues.

I. OVERVIEW OF THE AVAILABLE LITERATURE

The available literature on educational R/D&I funding is of three types:

1. pieces that refer to funding issues or problems as part of some broader discussion of issues;
2. presentations of data series or analyses of substantial bodies of funding data; and
3. policy analyses focused on funding issues.

1. Broader Discussions that Mention Funding Issues or Problems

Almost from the outset of active federal involvement in the sponsorship of educational R/D&I, and especially since the creation of the labs and centers, funding problems have been referred to in the literature. Initial expectations for high (and ever-increasing) levels of funding were quickly dashed, and the literature of the late '60s is filled with pleas for more funding, more stable allocations, longer funding cycles, etc.[1] Many of the same points are made in more recent assessments as well as (for instance, the Campbell Report's recommendation for higher levels of R&D funding,[2] or Sam Sieber's call for greater "balance" and "continuity" as two design requisites for a national R&D system for education[3]).

Several interesting sets of statistics are included in some of these broader presentations, especially to buttress the argument that higher levels of funding are needed to enable educational R&D to achieve its goals. One favorite kind of statistic examines educational R&D funding as a percentage of total education expenditures and compares this to allocations for R&D in other sectors.[4] Another provocative use of statistics is the 1968 USOE Bureau of Research "what might be" analysis described in the OE status report -- an estimate of the annual need for development funding based on estimates of the (a) total number of alternative curriculum units that should be considered for development to cover the full range of school years and subjects, (b) the average per unit development costs; and (c) the average number of years required from conception through installation for a given unit.[5] We shall consider these various sets of statistics later.

2. Data Series or Analyses of Large Bodies of Funding Data

There are currently four large bodies of data on educational R/D&I funding, and a fifth that should be available shortly.

A. NSF Data

The first of these is part of the broader body of data on federal funding of all R&D published annually since 1952 by the National Science Foundation's Division of Science Resource Studies. Education has been analyzed as a separate category only since the analysis published in 1971. The 1971 analysis provided data on education going back as far as 1963 for agencies with education as a primary mission (OE). The 1972 analysis was considerably broader in scope, covering all federally funded activities that could be categorized as educational R&D regardless of the primary mission of the sponsoring agency; however, these statistics on educational R&D across federal agencies go back only as far as 1969. Subsequent annual analyses in this series present educational R&D data for all federal agencies for 1969 and all subsequent years.[6]

B. OMB Data

A second annual series is published by the Office of Management and Budget (OMB) for submission to Congress each January along with the President's proposed budget. The Special Analyses are designed to show the fiscal impact of the various federal programs in specific functional areas. Education is one of these functional areas.[7]

C. NAS Data

The National Academy of Sciences (NAS) data base differs from the NSF and OMB data in being the result of a one-time study rather than an ongoing data series. The data were generated from a study of social R&D and related activities in 15 social policy areas. Education was one of these areas. The final report on this project has not yet been published, but preliminary data have been available to researchers and agency personnel at least since 1976.[8]

D. SRG Data

A fourth data base has been collected by the Social Research Group (SRG) of George Washington University for the Interagency Panels for Research and Development on Early Childhood and Adolescence, one of the interagency coordination mechanisms set up by the federal government. SRG publishes annual reports for the panels on the projects sponsored by the member agencies.[9] This data base is available for special analyses and a number of such special analyses have been conducted by NIE's R&D System Support Division.

E. Analyses by NIE's R&D System Support Division

The NSF, OMB, NAS, and SRG data bases provide different estimates of total federal funding of education R&D, for they differ considerably on a number of key dimensions which determined the kinds of data each collected and analyzed. The staff of NIE's R&D System Support Division have recently published a number of highly useful reports which identify the similarities and differences among these data bases, describe NIE's approach to each of the key conceptual and procedural issues on which these data bases differ, and then present what must be viewed as the best current funding estimates available that make optimal use of the information provided by all four data bases. The reports forthcoming to date provide estimates of total federal funding for education R&D and the distribution of total funding across agencies, functions, project content, and performing organizations. They also provide information about how agencies differ in the funding they provide by function, by project content, and by performing organizations.[10] We will consider these analyses in some detail later in this chapter.

F. NIE's Education KPU Monitoring Program

NIE's R&D System Support Division has plans for an Education KPU Monitoring Program, developed along lines parallel to the program of the Science Resources Division of NSF. The monitoring program is expected to gather periodic statistics on the educational R&D system as a basis for descriptive status reports, analysis to increase understanding of system functioning, and evaluations of the impact of various R&D system policy initiatives. In addition, the Monitoring Program is envisioned to include data-gathering for special in-depth policy studies of specific system issues.

The program has not as yet received ample funding for more than a few of the preliminary projects. The data-gathering and analyses leading to the publication of the 1976 Databook were the first of these projects. The analyses of federal funding of education KPU mentioned earlier also fall under this broad program.

A current very important project involves a survey of all organizations identified as R&D performers. Basic information is being gathered on: funding, personnel, R/D&I activities, numbers of projects, history, involvement in inter-organizational collaborative arrangements, etc. These data should be available for secondary analyses in 1979. It was expected that this survey would be repeated on a periodic basis, and that it would probably be expanded and supplemented by other periodic surveys in the future. At the present time, however, the future prospects for this ambitious program are unclear.

If ample funding for this program is not forthcoming in the future, another possibility for use as a data base for monitoring education KPU might be expansion and refinement of the Interagency Research Information System (IRIS), referred to earlier as the SRG data base. However, given the projected costs of such a proposal, this does not seem to have received an enthusiastic response from the member agencies of the Federal Interagency Committee on Education (FICE) Subcommittee on Education RDD&E which supports the maintenance of this data base.[11] It remains to be seen whether or not the creation of the Federal Council on Education Research and Development adds force to the argument that a monitoring system for education KPU is needed. However, regardless of what is done in the future to carry out plans for an ongoing monitoring system, much can be gained from the publication of findings from the current organizational survey. And too, additional insights may be derived from secondary analyses when the data base is made available to R&D system researchers and policy analysts.

G. The 1969 OE Status Report

The best published source of information on educational R/D&I funding in this country as of 1969 may still be the Office of Education's status report prepared by Hendrik Gideonse and his staff for the OECD cross-national review of educational R&D.[12] This analysis provides data not only on OE funding during the '50s and '60s, but also education R&D funding data from NSF, OEO, and other federal agencies. Also included is some minimal information about funding provided by private foundations and other sources (state agencies, universities, professional associations, etc.) and an estimate on the total spent on education R&D in the U.S. by all sources in FY 1968.

H. NIE's 1976 Databook

In 1976, Ward Mason and his staff in the R&D System Support Division of NIE published the 1976 Databook,[13] based on contract work carried out by Stanford University by William Paisley, Matilda Butler-Paisley, and Karen Shapiro.[14] The Databook updated and expanded on the funding data provided in OE's 1969 status report. It provided updated estimates of total education R&D funding in the U.S. and funding provided by various federal agencies, by SEAs and LEAs, by foundations, academic institutions, and industry. (The estimates of Total federal funding were later refined and further updated in the NIE analyses referred to above in section E.) In addition, the Databook provided detailed information about the federal funding obligated to specific programs and topics by federal agencies sponsoring significant amounts of educational R&D, the funding provided to specialized R/D&I institutions, and the distribution of funds geographically.

We will draw on funding data from both the OE status report and the NIE Databook in this chapter.

3. Policy Analyses Focused on Funding Issues

There is probably a large fugitive literature of internal memoranda and consultants' reports prepared for R/D&I sponsors on their funding policies. We have made no effort to be comprehensive in our review of such policy analyses. Nor have we tried to locate or to present a representative sample of such analyses. Rather, we consider here analyses that have been produced in recent years on four particular funding issues which we view as critical in their potential impact on the shape of the educational R/D&I enterprise in this country for some time to come.

A. Institutional Support vs. Program Purchase

In 1972, while legislation for the creation of NIE was still pending, OE made a radical change in its funding policies for the labs and centers.[15] Instead of "institutional support" for these institutions, (which guaranteed their existence and eliminated them from competition with other R&D performers for federal funds), the new "program purchase" policy assumed these institutions had now reached mature status, were no longer entitled to special treatment, and should therefore compete on an equal footing with other R&D institutions for multi-year program support.

NIE inherited the program purchase policy along with responsibility for the labs and centers. The debate over "institutional support" vs. "program purchase", though, continued in the early years of NIE's exhistence. Though NIE presumably resolved it from the outset in favor of "program purchase", the labs and centers were able to get the decision reopened and then reversed. The issue has reemerged intermittently in various forms and may appear again as a live question in funding policy for educational R/D&I.

One particular form in which the questions were raised appears in some internal OE documents circulated in 1972 -- one by Charles Frye elaborating the policy and a second by Ward Mason raising some issues in relation to implementation of this policy.[16] We will consider these documents later in our analysis.

B. The Campbell Report

In 1975, NIE commissioned a panel of consultants chaired by Ronald Campbell to review NIE's funding policies, especially those with regard to the labs and centers and the issue of program purchase vs. institutional support. In a few months, the panel produced the "Campbell Report", calling for (among other things) the creation of "national laboratories" to replace the regional laboratory concept -- selecting them from among the existing labs and centers those that meet criteria of high quality and relevance to NIE's missions, and entering into "special relationships" with some other high quality institutions as well. We shall consider several of the recommendations made in this report later, particularly its criticism of NIE's heavy reliance on procurement through open competition rather than "funding and supporting those who can best do NIE's work," the latter being the policy advocated by the consultants who prepared the report.

C. Agency-Field Relationships in the Educational R/D&I System

A third funding policy analysis we draw on in this chapter is a report we prepared for NIE in 1976,[18] approximately a year after the Campbell Report was submitted and apparently shelved.

The analysis requested by the agency was to focus on what the appropriate balance should be between field-initiated and NIE-directed research and R&D. The issue was under review within NIE,[19] in response to considerable criticism from the field. NIE has been severely criticized by the research community: funding for field-initiated research had dwindled and was for a time totally eliminated, and the agency was relying increasingly on agency directed approaches to procuring research and R&D (primarily open-competition in response to RFPs prepared by NIE staff or occaisionally consultants).

Our CISST policy analysis team reconceptualized the issue in terms of how NIE could achieve its purposes, through procurements <u>and</u> other actions, taken in collaboration with the field. This approach was an attempt to put the procurement question into a broader context, provide a comprehensive framework for policy development for NIE as the lead agency for educational R/D&I, and permit integration of funding policies with other agency policies. The analysis focused heavily on : (a) the lead agency concept; (b) an approach to understanding educational R/D&I as an immature system in need of system-building and therefore macro-level leadership; (c) the manner in which system building purposes can be built into procurements; and (d) the approaches an agency can take in relating to the field to achieve its purposes (system-building as well as other purposes) in collaboration with the field. The analysis touches on one of the same questions considered in the

Campbell Report -- i.e., the need to reach out to the best R/D&I performers to solicit work from them and build their (and thereby the system's) capabilities. We shall consider the analysis in some detail later in this chapter.

D. Strengthening Fundamental Research

Although the Agency-Field Relationship analysis seemed to be enthusiastically received, creating a considerable stir within some units in the agency for a few months,[20] it too was shelved, like the Campbell Report before it. Just how little impact the report had can be seen from a fourth set of documents we consider in our section on funding policy issues -- i.e., 1977 documents relating to NIE's policy decisions on the funding of field-initiated fundamental research, a key element in the field-initiated vs. agency-directed issue NIE had requested guidance on in commissioning the CISST policy analysis the previous year (Agency-Field Relationships).

These documents include: (a) the final report of the National Academy of Sciences (NAS) Committee of Fundamental Research Relevent to Education,[21] commissioned by NIE; (b) the report of the Program committee of the National Council on Educational Research (NCER), NIE's policy making body, including the NCER draft resolution on the funding of field-initiated research;[22] and (c) an examination of both these documents by our CISST policy analysis team, under a contract with NIE (including both a critique of these pieces and a proposed alternative approach for the funding of fundamental research relevent to education).[23]

These documents are of interest not only for the particular funding policy issue they explore, but also for underscoring how little impact policy analysis is likely to have when it runs counter to policy preferences already formed or to policy pressures from interest groups to whom decision makers feel a need to be responsive -- whether because these pressures reflect their own preferences, or for some other reasons. In this case, the policy decision that was made used one of these reports as a justification (the NAS report), though it went considerably beyond what was specifically called for in that report, and ignored the recommendations made in two other reports commissioned by NIE (both Agency-Field Relationships and Strengthening Fundamental Research, our analysis of the NAS and NCER drafts on fundamental research). We shall consider all of this in some detail later in this chapter.

II. FUNDING PROBLEMS

The funding of educational R?D&I has tended to suffer from five key weaknesses: relatively low levels of funding, insufficient diversification of sources, instability, inadequate concentration, and inadequate attention to funding policy development. We shall consider eachof these problem areas in turn.

1. Relatively Low Levels of Funding

Several kinds of statistics have been used to underscore the point that the level of funding that has been available for educational R/D&I is rather low, considerably too low to meet the need. The most basic of these statistics are (A) stimates of the total funding support for educational R/D&I in this country, from all sources. This basic statistic is then used in several other calculations comparing this statistic to others: (B) expenditures on R/D&I in the education sector as a percentage total spending on R&D in this country; (C) educational R/D&I expenditures as a percentage of total education expenditures by all levels of government in this country; (D) comparisons of the percentage of education expenditures allocated to R/D&I with percentages allocated to R&D in other sectors; and comparisons of the same allocated to educational R/D&I with (E) expectations about levels of funding growth for educational R/D&I and (F) estimates of the sums required to meet the need for educational R/D&I outputs.

A. Estimate of Total Funding for Educational R/D&I

The best available estimate of total funding for educational R/D&I in this country from all sources (public and private) is somewhere between $605 million and $673 million (depending on what is included or excluded from the given estimate), with $619 million the most likely figure.[24] These data are for Fiscal Year 1975, the most recent year for which such an estimate is available.

B. Educational R/D&I Spending in Comparison to Total Spending in the U.S.

That $619 million represents perhaps 2% of the total spent on R&D by all sources in this country. In 1973, total R&D expenditures in this country were over $30 billion.[25] That figure is shurely somewhat higher now.

C. Educational R/D&I Expenditures as a Percentage of Total Education Expenditures

Even more significant than the fact that only 2% of all R&D funds in this country are spent in the education sector is another statistic which underscores how little of the money spent on education in this country is allocated to R/D&I activities. By the early 1970's, education expenditures had reached $90 billion and are expected to soon exceed $100 billion.[26] Using the $90 billion figure, and the $619 million estimate of FY 1975 expenditures for educational R&D by all sources, we calculate that no more than 0.7% of total education expenditures are allocated to R/D&I activities.

D. Comparison of Allocations to R/D&I in Education and Other Sectors

The inadequacy of the educational R/D&I funding level is suggested by comparison of the allocations to R/D&I in education with similar allocations in other sectors. Of all the statistics used to buttress the argument for higher educational R/D&I funding levels, these statistics are cited most frequently.[27] The comparison to the 0.7% figure for educational R/D&I noted above, the following figures are cited for other sectors: in industry, 3.4% to 5% of expenditures are allocated to R&D; in agriculture, 1.1%; in health care, the figure is given as 5%.

If attention is restricted to allocations by the federal government alone, the relevant comparisons are as follows: the federal government spends 1% of all its education funding on R&D (4.5% of all its education funding on the broader "KPU"); in comparison, 1.7% of total federal spending on health goes to R&D and over 10% of federal defense spending goes to R&D. Such comparisons, though, may be somewhat risky. As pointed out by Ward Mason and Nelson Carnot of NIE's R&D System Support Division,[28] the federal government provides different levels of support for different sectors. In the defense sector, the federal government provides virtually all funding -- for R&D and for the operational system. In the education sector, by way of contrast, the federal contribution to anual education expenditures amounts to only 11%, with the remainder provided by state and local governments. The federal R&D budget is oriented heavily to only a few sectors, with defense accounting for half of the R&D budget; space and exploration, another 15%; and health an additional 15%. Educations's portion of the total federal R&D budget amounts to only slightly more than 1%.

This would seem to suggest that educational R&D is assigned a relatively low priority by federal decision makers. But other factors must be considered as well. For instance, defense R&D is likely to require considerably more costly technology than educational R&D. Or, one might assume that educational R&D is heavily funded by sponsors other than the federal government (which is not the case,as we shall soon see) and therefore that additional federal funding might not be needed. Or, it might be argued that the immature state of development of educational R/D&I at this time severely limits the amount of money that can be spent productively and the rate of quality expansion of the educational R/D&I enterprise that can be expected for the near future -- a valid point we shall deal with later in this chapter.

Even taking all considerations into account, these comparisons suggest that the level of funding for educational R/D&I is likely to pose a serious problem. This conclusion seems underscored further by a number of other contextual factors that affect educational R/D&I, notably: (a) the immaturity of educational R/D&I compared to these other sectors and the resultant need for expensive capacity-building expenditures and investment in developing the field's knowledge and technology base, and (b) the enormous size and variability as well as the pluralistic pattern of decisionmaking that characterize the operating system to be impacted. Clearly, then, substantial resource investment is likely to be needed apart from the costs of product development activities analogous to those in other sectors.

E. Expectations about Levels of Funding Growth

The first annual appropriation for the Cooperative Research Program (CRP) in 1957 was for only $1 million. That figure more than doubled the following year. By Fiscal Year 1960, in only four years' time, OE was spending approximately $10 million for research and dissemination appropriated under CRP, NDEA, and other legislation. By 1964, four years later, that figure nearly doubled to over $19 million. The very next year, FY 1965, the funding level doubled again to over $36 million. And one year later, in FY 1966, the figure nearly tripled to over $100 million.

That astonishing growth rate generated high expectations for continuing expansion of the educational R&D system. However, the year 1966 represents the end of the rapid growth period and USOE funding for "research and training" remained around $100 million for several subsequent years.[30]

There have, of course, been substantial gains in the level of funding for educational R/D&I. In 1969, OE estimated in its status report that approximately $250 million was spent on educational R/D&I in this country by all sources.[31] As of FY 1975, as noted earlier, NIE estimated that same figure to be approximately $691 million. Other statistics show gains also. For instance, earlier literature cited statistics showing educational R&D receiving a smaller percentage of the total education dollar (0.2% - 0.3%)[32] and the federal education dollar (0.5%)[33], than is the case for the FY 1975 data -- i.e., 0.7% of total expenditures and approximately 1% of the federal education expenditures were spent on R&D in FY 1975. The differences may, of course, be due to differences in the way the statistics were calculated at different times, or to more complete information available now than earlier. But it certainly does seem equally if not even more plausible that education R/D&I expenditures are increasing somewhat faster than the total education expenditures.

Still, whatever the growth rate has been since 1966, funding levels have fallen far short of early expectations. This becomes abundantly clear from examination of some of the literature of the late '60's, as the peaking of federal funding for educational R/D&I began to be felt. As discussed by Francis Chase and Stephan Bailey (who successively headed the National Advisory Committee on Educational Laboratories in the '60's), the laboratories alone were expected to receive funding of $100 million a year, and even this figure was described by Chase as too low to permit them to function adequately. Chase estimated that the regional laboratories would each have needed between $3 million and $10 million a year to carry out the kinds of work they were to perform; the R&D centers were expected to need at least $2 million to $3 million a year. Clearly, the then-extant funding level of $30 million a year for 29 labs and centers had fallen far short of the expectations of the proponents of educational R/D&I.[34]

F. Comparison of Available Funding with Estimates of Needs and Costs

There is relatively little agreement in the field of education on what is needed to improve the schools and certainly nothing like a comprehensive data base on needs and the probable costs of alternative approaches to meeting those needs. There is not even an easily accessible data base on the cost of more than a handful of the enormous number of educational R/D&I outputs that have been produced. We are told, for instance, that Sesame Street spent $8 million a year in its early years; that it cost $100 million in direct development costs for each videotaped minicourse developed by the Far West Laboratory to train experienced teachers in specific skills; that by 1960, when NSF's Course Content Improvement Program was in full swing, NSF was spending between $5 million and $6 million a year on a dozen development projects (including PSSC physics, BSCS biology, CHEM chemistry, and SMSG mathematics).[35] However, it is rather difficult to make effective use of such information, especially for the planning of funding requirements.

One of the most interesting attempts to estimate needs and costs was carried out nu OE planners in 1968 and described by Hendrik Gideose and his staff in the 1969 OE status report:

> Bureau officials developed what they felt was a conservative estimate of the continuing need for support of educational development work alone. Using existing organizational categorizations for education, Bureau officials estimated at 20 the number of school years for which the Bureau of Research has development responsibilities. The estimate was based on two preschool years, 2 postsecondary years in vocational and technical areas, and 4 undergraduate years at the College level. The Bureau estimated that a reasonable number of full-year curriculums which might be developed for each of these 20 school years would be 10 (e.g., 10 subject matter feilds for grade 11, etc.). On this estimate the

total number of full-year curriculums, ststed as units, for which the Bureau of Research could be responsible would be 200. If, furthermore, the Bureau were to persue as policy the development of alternative approaches to each unit to permit and indeed enhance local and State options in course selection, the total number of potential curriculum units competing for support can be calculated at 600. In addition to the development of learning-effective materials within the existing structure of schooling and education (what industry would call defensive research and development) it might also be deemed desireable to develop alternative approaches to existing instructional arrangements and school organization (offensive research and development). This additional effort, equivalent to perhaps 200 curriculum units, would be directed to what can be termed radical departures from existing instructional practice.

The potential "field" for educational development at any given point and time, therefore might approximate 800 units of development work designed to produce learning materials for one full year's instructional use in a given curricular area. Estimates now increasingly more firmly based on hard data suggest an average cost for the development of such a curriculum unit of approximately $4 million. If the time span for a development unit is approximately 7 years from the time of conception of the idea to the completion and release of the materials to the school systems of the nation, then it is possible to conclude (800 course units times $4 million divided by 7 years) that the average investment which might reasonably be directed to educational development each year approaches $460 million.36

It should be noted that the $460 million per year estimate is for curriculum development costs only. It does not cover the considerable costs likely to be incurred in support of fundamental research, dissemination, demonstration, implementation/utilization support, personnel training and other capacity-building programs, etc.

Of course, this mind-boggling "what might be" analysis is purely hypothetical. And certainly one need not conceive of all this potential development work being undertaken at the same time. Still, it is useful as an indicator of the scale of the potential need, and is at least suggestive that the current funding levels for educational R/D&I are not adequate to meet the needs for some time to come.

G. Summary: Low Levels of Funding

In summary, the best available estimate is that approximately $619 million is spent each year in this country on educational R/D&I. That $619 million represents approximately only 2% of the total spent on R&D in this country and only 0.7% of the total education expenditures. The percentage of education expenditures allocated to R&D compares very unfavorably to similar figures for such other sectors as industry, agriculture, and health care. This is especially true when consideration is given to the immaturity of educational R/D&I and the need for costly capacity-building expenditures apart from the direct costs of product development. The $619 million figure seems even more inadequate when viewed in the light of: (a) early expectations about funding levels (and the rate at which they would grow), and (b) estimates of the considerable need for educational R/D&I outputs and the heavy costs likely to be incurred.

2. Insufficient Diversification of Soursés

Of the approximately $619 million estimated to be spent each year on educational R/D&I in this country, the best available estimate is that $513 million, or 83% (in FY 1975) came from various departments or agencies of the federal government.[37] Clearly, the federal government has become the primary sponsor of educational R/D&I. The remaining 17% came from state and local governments, private foundations, and other private sector sources (universities, industry, etc.).

Greater diversification of sponsorship would seem to be advisable given the political vulnerability of educational R/D&I expenditures in a climate of limited R/D&I system legitimacy and lack of substantial confidence in the system's ability to produce a reasonable return on the taxpayer's investment. Clearly, though, substantial investment in educational R/D&I by the private sector or by state or local governments is not highly likely unless imaginative new incentives are provided and bold new initiatives are taken to attract this new sponsorship. NIE's program of grants to states for building statewide dissemination capacity may function in the long run as seed money to attract additional state funds to the support of dissemination and other R/D&I functions. And clearly, states have expanded their functioning in these areas.[38] At various times over the past 10 to 15 years, efforts have been made to create incentives to attract private industry to educational R/D&I.[39] We have little way of knowing how much more R/D&I funding can be attracted from private foundations. And higher education institutions have been under severe financial pressures, making allocations of sizable internal funding for R/D&I unlikely. Still, there has been considerable discussion in recent years of the need to strengthen the role of the universities in the conducy of research and R&D, and perhaps innovative approaches to sponsorship may be found (e.g., pooling foundation, federal, and university funds for particular proframs). Whatever the specific approaches, given the severely limited growth rate of federal funding for educational R/D&I in recent years, greater diversification of funding seems essential if the scope of the educational R/D&I enterprise id to expand substantially.

3. Instability of Funding

Instability of funding has been one of the most serious problems faced by educational R/D&I over its brief history. The early promise of ample funding was clouded within only a few years, with the rapid expansion of funding for the labs and centers peaking as early as 1966.[40]

Funding for different types of R/D&I activities has tended to ebb and flow within the frequent shifts and fluctuations in federal educational R/D&I priorities. Fundamental research, for instance, suffered from an absolute as well as a relative decline infunding after its early period of expansion under the Cooperative Research Program. It has now rebounded and appears to be on the rise again, especially in the funds obligated by NIE. Development funding, to consider another example, expanded rapidly in the late '60s, only to become a reconsidered and lesser priority in the '70s. And within functions, specific topics and research areas seem also to have come into and then got out of favor.

Federal reliance on annual rather than longer-term funding cycles was a frequent cause of complaint in the early tears of educational R/D&I. Pleas were made for longer-term funding commitments to permit long-range planning of complex multi-year projects,[41] and some modification of the funding policies in this direction has been apparent.

The creation of NIE seemed for a time to only add to this instability. In the early years of its existence, NIE underwent several changes of directors and internal reorganizations, which created instability in some program areas. NIE's appropriation struggles with Congress added to the shaky image of the educational R/D&I enterprise. Created initially with an FY 1973 funding level of over $100 million, the Institute was threatened with a zero funding level that would have terminated its existence the very nexy year. Eventually, NIE funding over the next few years stabilized at approximately the $70 to $75 million level. But clearly, the ups and downs of funding for this lead agency for the system in just a few years, and the enormous gap between the current $90 million level and the initially expected level of nearly double that,[42] suggest that the educational R/D&I enterprise still lacks sufficient funding stability to support long-term planning and system development. It would seem that greater long-term stability will be needed to attract the resource base of first-rate personnel and subcontractors needed to permit system maturation.

4. Inadequate Concentration of Funding

The difficulties posed by low overall funding levels are complicated further by allocation patterns that tend to disperse what little money is available over a large number of projects rather than concentrating it sufficiently on a few. The trend appears to have been toward greater and greater concentration of funding, as more and more projects have lost funding and increasing numbers of federally supported R/D&I institutions have gone out of existence. Still, given the limited funding available and the high costs incurred by large-scale educational R/D&I programs, greater concentration may be essential if effective programs and products are to be produced.

5. Inadequate Attention to Funding Policy Development

From our perspective, a well conceived funding policy for educational R/D&I would be formulated after consideration of a host of factors -- for instance, agency mission and goals in relation to those of other sponsors of educational R/D&I; the state of development of the educational R/D&I system and its system building requirements; the existing degree of balance or imbalance among R/D&I functions as currently funded (as compared to some sense of minimum degrees of balance required for adequate system functioning and development); the need for some degree of stability and continuity, etc.

There is relatively little evidence of much attention to these kinds of systematic considerations in the planning or budgeting processes of NIE as the lead agency for educational R/D&I, or of any of the other key sponsors of any of the other key sponsors of educational R/D&I. (This is apparent in the manner in which the National Council of Education recently resolved the issue of establishing a budget set-aside for fundamental research. We shall have more to say about this later in this chapter.) Since at this time funding policy appears to be the primary leverage federal agencies are able to exert on R/D&I functioning, these sorts of issues would seem to warrent considerable attention.

III. AVAILABLE DATA ON EDUCATIONAL R/D&I FUNDING

Until recently, very little specific information was available on funding of educational R/D&I. Dollar amounts were published for specific programs or agencies. But few analysts attempted to answer such basic questions as: how much money was being spent, by whom, for what, with what consequences -- either for educational R/D&I as a whole, or for the segment of educational R/D&I supplied by federal agencies.[43]

here were the data series on R&D funding published by NSF and OMB.[44] But (as we shall see shortly) the information supplied by these analyses had several shortcomings for establishing R&D funding levels for the field of education.

There are still many unanswered questions, as we shall take note of some of these in a subsequent section of this analysis. But thanks to the efforts of Ward Mason and his staff in NIE's R&D System Support Division, we have learned a great deal about how federal funding is distributed across sources, functions, performing organizations, subject areas, target populations, etc. -- essential information as a basis for considering policy implications of funding, how it affects the functioning of the educational R/D&I system, and how it might be used to improve R/D&I functioning in the future.

In this section, we shall attempt to summarize the available data, both from the R&D System Support Division reports and articles and from other sources as well. We shall consider what the available data tell us about:

1. the growth of funding for educational R/D&I
2. the total funding level for educational R/D&I from all sources (federal agencies and other sources); and
3. how federal funding of educational R/D&I is distributed across sources (i.e., agencies), functions, project content areas, target groups, and performer organizations.

1. Growth of Educational R/D&I Funding

Tables 6.1 - 6.4 and Figure 6.1, reproduced from the 1969 OE status report,[45] document the rapid growth of educational R/D&I funding in the late '50s and the '60s. As we noted earlier in this chapter:[46] the first annual appropriation for the Cooperative Research Program in 1957 was only $1 million; that figure more than doubled the following year; by FY 1960, in only four years' time, oe was spending approximately $10 million for research and dissemination (appropriated under CRP, NDEA, and other legislation); by FY 1964, four years later, that figure had nearly doubled to $19 million; the very next year, FY 1965, the funding level doubled again to over $36 million; and one year later, in FY 1966, that figure nearly tripled to over $100 million.

Federal agencies other than OE, NSF, and OEO and other funding sources were also spending money on educational R/D&I during these years. Table 6.5, from the 1969 status report,[47] presents documented figures from other educational R/D&I sponsors as well. As shown here, the documented total (described in the report as the "documented minimum base financial support for educational R&D") was over $192 million for FY 1968. In addition, the OE analysts judged the extent of under-reporting in these figures as approximately 25%, and therefore estimated that conservatively the total amount spent on educational R&D in this country in FY 1968 was approximately $250 million.[48]

Although the growth rate slowed down since the rapid expansion reported for the period betwees 1957 and 1968, that $250 million total figure has clearly more than doubled over the past decade. Based on the analyses of FY 1975 data conducted by NIE's R&D System Support Division, the best estimate of the total spent on educational R/D&I in this

(In thousands of dollars)

Fiscal Year	Project R&D	R&D Centers	Laboratories	ERIC	Training	Construction	Total
1969 (est.)	$23,667	$10,800	$23,600	$4,226	$6,750	$29,581	$98,624
1968	20,723	10,893	22,926	2,845	6,164	593	64,144
1967	20,514	8,030	17,669	2,693	6,481	329	58,676
1966	26,429	6,579	8,658	1,064	7,189	1,311	51,230
1965	13,672	2,168	---	---	---	---	15,840
1964	10,500	998	---	---	---	---	11,498
1963	6,985	---	---	---	---	---	6,985
1962	4,644	---	---	---	---	---	4,644
1961	3,356	---	---	---	---	---	3,356
1960	3,196	---	---	---	---	---	3,196
1959	2,700	---	---	---	---	---	2,700
1958	2,300	---	---	---	---	---	2,300
1957	998	---	---	---	---	---	998

Table 6.2

Bureau of Research Obligations (for Cooperative Research Only)

Fiscal Year	Net Obligations (thousands)
1955	$ 9
1956	17
1957	630
1958	835
1959	6,030
1960	6,299
1961	6,411
1962	8,990
1963	12,632
1964	13,976
1965	14,552
1966	15,564
1967	18,355
1968	19,352
1969	13,100 (estimate)

SOURCE: "NSF Justification of Estimate of Appropriations—The Congress," Fiscal Years 1957 through 1970.

Table 6.3

Course Content Improvement
Program Obligations for Fiscal Years
1955-1969

	Fiscal Year		
	1967	1968	1969
Head Start			
Research & Demonstration	$ [illegible]1	$ 3.6	$ 4.1
Evaluation	1.7	2.3	1.9
Total	5.8	5.9	6.0
Follow Through			
Research & Demonstration	——	1.2	2.5
Evaluation	——	1.0	1.8
Total	——	2.2	4.3
Community Action Program (Education)			
Research & Demonstration	5.2	4.7	4.0
Grand Total	11.0	12.8	14.3

Table 6.4

OEO Educational R&D Expenditures
(In Millions of Dollars)

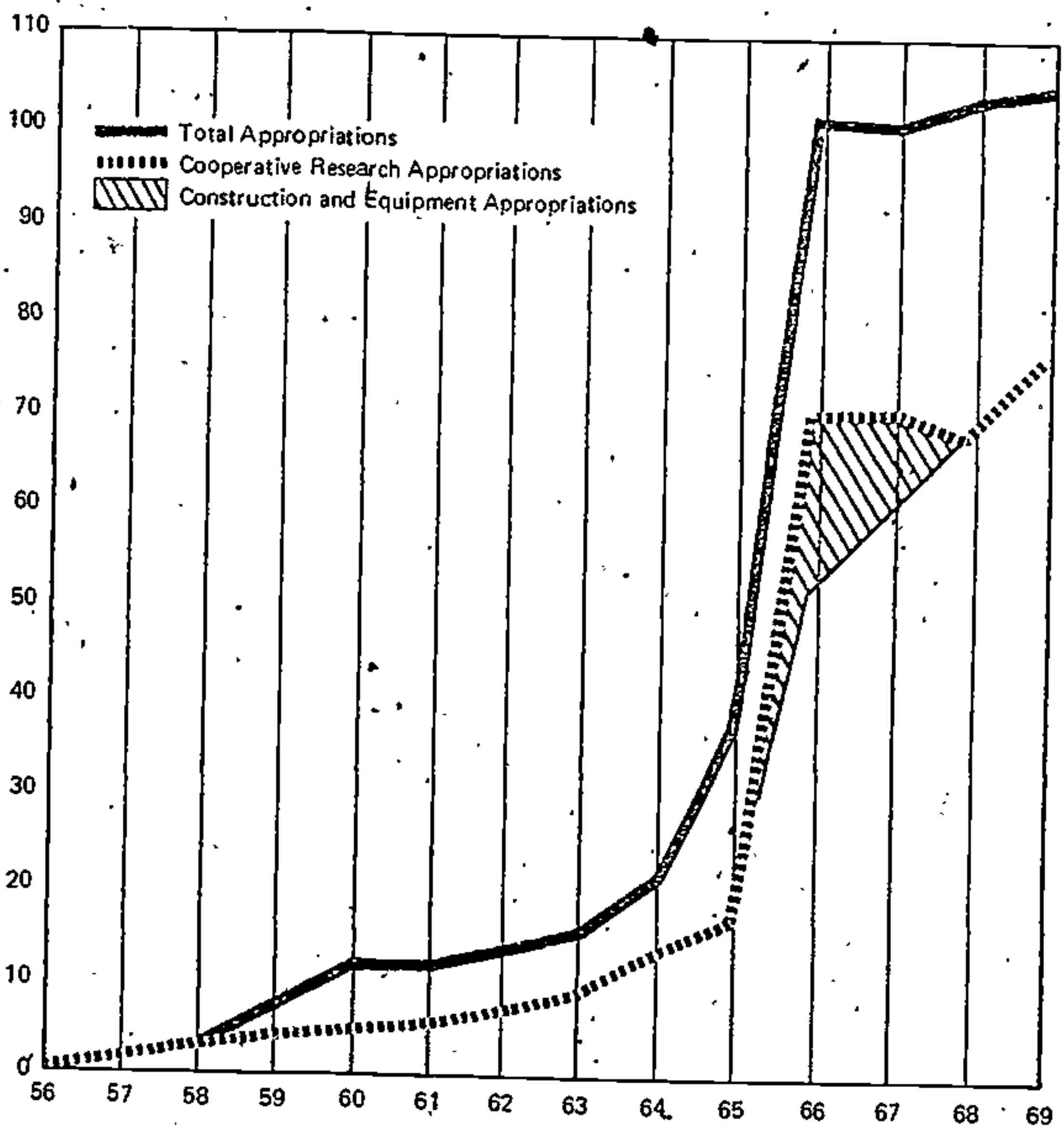

Figure 6.1
Appropriations for "Research and Training"
U.S. Office of Education, 1957-1969

TABLE 31.—DOCUMENTED MINIMUM BASE FINANCIAL SUPPORT FOR EDUCATIONAL RESEARCH AND DEVELOPMENT BY SPONSORING AGENCY

	FY 1968
United States Office of Education	$101,967,000
National Science Foundation	23,326,000
National Institute of Mental Health	11,860,000
National Institute of Child Health and Human Development	8,377,000
Office of Economic Opportunity	12,800,000
Department of Defense	6,046,000
Other Federal Agencies (Labor; Commerce; Children's Bureau; Agriculture; Social Rehabilitation Service; Food and Drug Administration; Interior; and Endowments for Arts and Humanities)	6,725,000
Private Foundations	7,344,000
All Other (State agencies; higher education institutions; professional and academic associations; etc.)	13,845,000*
Total	192,290,000

*The SIE- and DDC-collected material produced a figure somewhat lower than this. To it have been added amounts equal to available NSF figures representing the fiscal year 1965 obligations of State agencies and fiscal year 1967 local government agency obligations for educational R&D.

Table 6.5

Documented Minimum Base Financial Support for Educational Research and Development by Sponsoring Agency country by all sources is $613 million.[49]

2. Distribution of Total Educational R/D&I Funding by Sources

Tables 6.5 and 6.6 summerize the best available data on distribution of total educational R/D&I funding by sources, for FY 1968 and for FY 1975.

A. FY 1968

Table 6.5, from the 1969 OE status report, presents the documented figures for FY 1968 totalling over $192 million. The double asterisks we have added to the table indicate the funding sources noted by the OE analysts as probably underreported in this table. Based on the extent of underreporting,[50] as noted above, the OE analysts estimated conservatively that around $250 million was spent by all sources in this country in FY 1968 for educational R/D&I activities.

Although the items in this table can be used to gain some sense of the distribution of the total by funding sources, it should be emphasized that most of the sponsors the OE analysts pinpointed as underreported were non-federal sources. Therefore, the proportion of the total spent by private foundations, private industry, and state and local governments is likely to be a substantially larger figure than is suggested by this table.

Of the $192 million documented total, more than half (approximately $102 million) came from OE, another $23 million from NSF, $13 million from OEO, $20 million from the National Institutes of Mental Health and of Child Health and Human Development, another

TABLE 6.6

Sources of Funding for Educational R/D&I

(Dollars in Millions)

	(FY 1975 obligations)
1. Federal Government Departments and Agencies	
A. Department of HEW	422.9
a. Education Division (358.8)	
- OE (264.5)	
- NIE (73.8)	
- ASE (20.6)	
b. Public Health Service (47.2)	
c. Office of Human Development (15.4)	
d. Asst. Secretary - Planning and Eval. (1.3)	
e. Social Rehabilitation Service (.2)	
*B. Department of Agriculture	0.1
C. Department of Defense	21.5
D. Department of Interior	1.2
E. Department of Labor	0.1
F. Department of State	1.4
G. Indepaendent Agencies	
a. Action	0.0*
b. Appalachian Regional Commission	1.3
c. Community Service Administration	2.5
d. National Endowment for the Arts	0.0*
e. National Endowment for the Humanities	17.1
f. National Science Foundation	39.9
g. Smithsonian Institution	3.2
2. State Government Funds	40.0 (30.0 - 60.0)**
3. Local Government Funds	4.0 (2.0 - 10.0)**
4. Private Foundations	57.0 (57.0 - 65.0)**
5. Other Private Sector Sources	5.0 (3.0 - 25.0)**

$6 million from the Department of Defense (likely to be a substantially underestimated figure), and around $7 million from other federal agencies.

Based on these figures, even with their limitations, it seems clear that in FY 1968 the federal government was the dominant sponsor of educational R/D&I activities in this country, and that within the federal government half or more was spent through OE.

B. FY 1975

Table 5.6 summarizes the best information available for FY 1975, combining estimates for non-federal funding sources from NIE's 1976 Databook with updated information on FY 1975 federal obligations for educational R/D&I from subsequent analyses prepared by NIE's R&D System Support Division.[51]

a. Non-Federal Sources

Although it would appear from this table that we know a bit more about non-federal sources of educational R/D&I funding for FY 1975 than we did for FY 1968, it must still be underscored that the information on state, local, and private sector funding represents estimates from highly inadequate sources. The state and local data, for instance, come from NSF data series that do not include dissimination and utilization activities (which are clearly of major significance in the educational R/D&I funding provided on the state and local levels). Also, the 1975 figures are extrapolated from the most recent data available -- i.e., 1973 for the state government figures, and 1969 for the local government data. There is reasonably good information about funding provided by private foundations, but virtually no data at all about other private sector sources of educational R/D&I funding.[52]

b. Federal Sources of Funding: Four Data Bases, and NIE's Composite Estimate

We are in a much stronger position now, though, with respect to understanding the sources and distribution of federal funding for educational R/D&I. The best estimates currently available were developed by NIE's R&D System Support Division, based on the four existing data bases on federal funding of educational R&D[53] we referred to earlier in this chapter:[54]

- The NSF data base: These data are collected anually from federal agencies by the NSF Division of Science Resource Studies and are published annually in An Analysis of Federal Funding by Function.

- The OMB data base: These data are collected anually for the Special Analyses submitted to Congress with the President's proposed budget each January. The data in these analyses are presented in aggregated form, across agencies, to provide an overview of how federal funding as a whole is affecting specific program areas. Educational R&D is one of these program areas.

- The NAS study of social research: this one-time study collected program-level data in 15 mutually exclusive social policy areas, including education as one of the fifteen areas.

- The SRG data base: This project - level data base is maintained by the Social Research Group of George Washington University from and for the member agencies of the Interagency Panel for Research and Development on Early Childhood and Adolescence.

These four data bases differ on several key conceptual and procedural issues. The differences are summarized in Figure 6.2, reproduced from an article published by Ward Mason and Carnot Nelson of NIE's R&D System Support Division.[55]

- Research functions: The four data bases differ significantly in terms of which research functions are included and therefore what is and is not included in the figures for educational R/D&I funding. The narrowest definition is used in the NSF data base, which includes data for only research and development. Excluded are such key functions as dissemination and demonstrations.[56] The broadest definition is provided by the NAS study which includes data on research, development, dissemination, demonstrations, evaluation, and statistical activities as well. As can be seen in Figure 6.2, the OMB and SRG data bases fall between these two extremes in terms of the research functions included.

- Definition of Education: Assumptions underlying these data bases differ in terms of the extent to which "education-relevant activities" are conceived to include training or informal education or non-school sources of learning as well as formal schooling. The definitional issue takes on particular significance in determining which areas of fundamental research are "relevant to education."

Issue	Data Base					
	NSF	OMB/Ed	NAS/NIE	SRG	NIE/Composite	FICE
Research Functions	Research Basic Applied Development	Research Development Experimentation & Demonstration Dissemination Evaluation	Knowledge Production Research Activities Statistical Act Problem Solution Evaluation Policy Formulation Demonstrations Development of Materials Miscellaneous Demonstrations Utilization Policy Implem Demonstrations Dissemination	Basic Applied Pilot Study Development Demonstration and/or Replication Evaluation Policy Research Research Support and Utilization Activities	Knowledge Production Basic Research Statistical Act Problem Solution Applied Research Evaluation Policy Formulation Demonstrations Development of Materials Miscellaneous Demonstrations Utilization Policy Implem Demonstrations Dissemination	Research Development Dissemination Evaluation
Definition of Education	None	A student-teacher relationship primarily for the transmission of organized knowledge, including vocational education or the provision of services to the community at large aimed at expanding an individual's opportunities for professional or career advancement	Education policy area Science Education Health Education Cultural Affairs Employ Manpower & Training (certain Department of Defense programs)	Educational services as primary or secondary focus plus basic research on cognitive or socio-emotional development	For basic research relevance to cognitive or socio-emotional development. Similarity or relevance to programs provided by the formal education system	None
Primary-Secondary Purpose	Primary	Primary & Secondary	Primary & Secondary	Primary & Secondary	Primary & Seconday	Primary
Budget Unit	Obligations	Outlays	Obligations	Obligations	Obligations	Not Applicable
Unit of Analysis	Program	Program	Program	Project	Not Applicable	Program
Coders	Self-report	Self-report	Trained	Trained	Trained	Self-report
1975 Dollars	161,200,000	442,187,000	452,225,000	295,041,000	513,044,000	Not Applicable

Figure 6.2

Comparison of Data Bases with Regard to Various Conceptual and Procedural Issues

- Primary and Secondary Purposes: The NSF data base differs from the others in that it includes data on only those programs for which education is the primary purpose. The other data bases are broader in that they also include programs that have education as a secondary purpose (e.g.: science education, where promoting science may be the primary purpose but educational objectives are clearly a secondary purpose).

- Budget Unit: Funding data are reported in the literature in terms of appropriations, obligations (i.e., funds committed through grants, contracts, etc.), and outlays (funds actually spent). The OMB data base describes outlays. All the other data bases are in terms of obligations.

- Unit of Analysis: The SRG data base is the only one in which data are collected on the project level. In all the others, data are gathered on the program level.

- Self-Report vs. Trained Coders: In the case of both the NSF and OMB data series, data are reported by agency officials. Each year, a different official within the agency might provide the information. And each official (and each agency) interprets the instructions and definitions in terms of his own frame of reference. The NAS, SRG, and NIE data bases have the advantage of being developed by trained coders, using uniform criteria across agencies for classifying programs and projects.

- Agency Inclusiveness: In addition, the different data bases differ in their range of inclusiveness of agencies. The NSF data base on education, for instance, is gathered from only a small number of federal agencies. The SRC data base is also limited in that it was developed from data from only the member agencies of the Interagency Panels for Research and Development on Early Childhood and Adolescence, and the projects reported include only those involving populations in the two age groups of concern to these agencies.

As the NIE analysts reviewed these data bases, it became clear that none of them was adequate to cover all the activities now defined as educational KPU funded by all federal agencies. The NSF data base was too limited in its coverage of federal agencies and research functions, and it was further limited in validity by the use of agency self-reports of the needed data. The OMB data base covered a larger number of agencies, but the data provided in the published reports could not be disaggregated to the level of detail desired. (For instance, the funding data could not be separated by function.) And these data, like the NSF data, suffered from their reliance on agency self-reports.

The NAS data had several advantages over the NSF and OMB data bases. The NAS study team developed a taxonomy of R/D&I functions covering the full range of functions and specifying definitions of terms. The data could be disaggregated to the level of agencies, subunits of agencies, and programs, as well as functions. The data were coded by a trained team of coders, and sufficient backup material was gathered on each program to permit recoding if additional criteria were developed. And most important for NIE purposes, the data were available in a form that permitted different decisions to be made by different analysts as to whether to include or exclude particular programs for different purposes.

However, the NAS data also had some limitations. (a) Data were collected on only four variables: agency/program, social policy area, R&D function, and fiscal year (1975-77). Further disaggregation (by target group, problem area, etc.) is not possible. (b) The data can be further disaggregated than the NSF or OMB data bases. However, they cannot be disaggregated to a level finer than the program level. Consequently, some large and heterogeneous programs had to be coded into single categories. If project-level data had been available, this would have permitted different components of these large, heterogeneous programs to be coded in different categories. (c) The data for the three fiscal years FY 1975-1977 have different meanings: FY 1975 data represent obligations; FY 1976 data represent some obligations and some estimates based on known appropriations; and FY 1977 data represent budget requests. Trend analyses based on such different kinds of data might be somewhat risky.[57]

The SRG data overcome some of these problems, but suffer from other weaknesses. It is the only data base that provides project level data. It shares with the NAS data base the advantages of use of a detailed classification scheme and trained coders. However, as described by the NIE analysts, the RG data base is "both larger and smaller than our /NIE's/ domain of interest". It is larger in that it includes many projects outside the area of education (e.d.: projects in the areas of health and welfare services). It is smaller in that the data are incomplete in terms of adequate representation of agencies, functions, topical areas, and age groups. The data come from only those agencies which are members of the Interagency Panels on Early Childhood and Adolescence Research and Development. There are 27 such agencies, but excluded are NSF, the Department of Defense, and the National Center for Educational Statistics, all of which contribute in important ways to federal support of educational R/D&I. Excluded are some dissemination activities and all general purpose statistical activities. The coverage of topical areas of relevance to education is severely limited: only projects focused on individual learning and development are included. And the age groups affected by the R/D&I work included in this data base are restricted to early childhood and adolescence. No work of relevance to post-secondary education or to adults is included in this data base.[58]

Given the strengths and weaknesses of these various data bases, the NIE analysts decided to develop a composite estimate that would permit maximum use of the information provided by all the data bases. The NAS data base was judged to be the most complete in terms of NIE's definition of the domain of interest, and therefore the NAS data were used as the starting point of the analysis. NIE developed its own analytical framework (which we shall discuss below) and used this framework as a basis for examining the NAS data and backup materials on programs to decide which programs should or should not be included in its composite data base and how the data should be regrouped and interpreted. In addition, the NIE analysts examined the other data bases to locate additional programs that fell within NIE's definition of the domain of interest but had not been included in the NAS data base. Where relevant, information from the other data bases was also used to answer remaining questions about the relevance of particular programs that might be included or excluded from NIE's composite data base.

We shall have more to say below about the NIE framework, and how and why the NAS scheme was modified by the NIE analysts. For our present purposes, we summarize below the findings of the first NIE analysis, designed to provide a "best estimate" of total federal funding for educational R/D&I. These findings are summarized in Table 6.7, reproduced from publications prepared by the NIE analysts.[59]

Department or agency and program	Dollars
Total	$513,044
Departments	
I. Department of HEW	422,854
A. Education Division	358,833
1. Office of Education	264,458
a Bureau of School Systems	70,312
(1) Suppl. Centers	10,000
(2) Equal Opportunity	640
(3) Follow Through	52,464
(4) Environmental Ed.	6,773
(5) Drug Education	435
b Bureau Occupational/Adult Ed.	43,086
c Bureau Education for Handicapped	33,722
d. Office of the Commissioner	84,235
(1) Office of Bilingual Education	68,555
(2) Right to Read	5,257
(3) Office of Career Education	10,423
e. Office of Planning/Budget/Evaluation	17,103
f. Bureau Post Secondary Ed.	3,800
g. Office of Indian Ed.	12,200
2. National Institute of Ed.	73,820
a. Basic Skills	20,798
b. Finance & Productivity	19,543
c. Education & Work	15,478
d. Educational Equity	8,465
e. Dissemination & Resources	6,933
f. School Capability for Problem Solving	2,603
3. Ass't Secretary for Ed.	20,555
a. NCES (Statistics)	8,293
b FIPSE (Post-Secondary)	11,300
c. Immediate Office	962
B. Public Health Service	47,151
1. ADAMHA	16,607
a. NIMH (Mental Health)	10,664
b. NIAA&A (Alcoholism)	3,135
c. NIDA (Drug Abuse)	2,808
2. Health Resources Adm.	14,775
a. Bureau Health Manpower	10,862
b Health Services Res.	3,414
c. Office Planning & Legis.	499
3. Nat'l Institutes of Health	12,962
a. NICHD (Child Health)	7,030
b NHLI (Heart & Lung)	4,265
c. NINCDS (Neurological)	1,167
d Nat'l Library Medicine	500
4. Center for Disease Control	1,956
Bureau of Health Education	1,956
5. Health Services Admin.	651
Bureau Community Health Serv.	651
C. Office of Human Development	15,364
1. Office Child Development	14,167
2 Administration on Aging	720
3 Office Youth Development	440
4 Rehabilitation Serv. Adm.	37
D Ass't Secretary Plan & Eval.	1,325
E Social Rehabilitation Serv.	181
II. Department of Agriculture	778
A. Coop. State Research Service	578
B. Food & Nutrition Service	200
III. Department of Defense	21,451
A. Navy	8,721
B. Army	5,070
C. Adv. Research Proj. Agency	4,069
D. Air Force	3,591
IV. Department of Interior	1,178
A Bur. of Indian Affairs	1,128
B National Park Service	50
V. Department of Labor	951
VI. Department of State	1,447
AID.	1,447
Independent Agencies	
I. ACTION	12
II. Appalachian Regional Com.	1,300
III. Community Service Adm.	2,500
IV. Nat'l. Endowment for the Arts	450
V. Nat'l. Endowment for the Humanities	17,081
VI. Nat'l. Science Foundation	39,875
VII. Smithsonian Institution	3,187

SOURCE: Nelson, Sowers, and Mason, 1977

Table 67

Composite Estimate of Federal Obligations for Education Knowledge Production and Utilization by Department or Agency and Program, Fiscal Year 1975 (Thousands)

As shown here, the total figure for FY 1975 obligations was estimated by the NIE analysts to be $513 million.[60] That figure was distributed across six federal departments, seven independent agencies, and 56 programs. The bulk of it, however, was obligated through the Department of Health, Education and Welfare. HEW's $422.9 million obligation represented 82.4% of the total. The Education Division of HEW alone accounted for 69.9% of the total federal funding figure (84.8% of the HEW figure). Within the Education Division, OE's $264.4 million obligation accounted for 51.5% of all federal funding for educational R/D&I, while NIE's $73.8 million accounted for 14.4%. Clearly, then, despite the fact that NIE was established as the lead agency for educational R&D, it controls a relatively small proportion of federal funding for educational R/D&I in this country. OE continues to be not only the single largest source of educational R/D&I funding but also the sponsor of more than half of all the federally funded educational R/D&I activity in this country.

3. Federal Funding of Educational R&D by Function

A. The NAS Data Base, as Modified by NIE

To determine how educational R&D funding was distributed across R&D functions,[61] the NIE analysts used the NAS data base as the best single source of information that also permitted reanalyses to be carried out with a minimum of difficulty.[62] That data base covered most (88%) of the programs included in NIE's composite data base. These data had the further advantage of careful coding by trained coders using a detailed scheme for classifying programs by functions and sub-functions. In addition, the backup material on each program permitted the NIE analysts to recode items where necessary to conform to NIE's analytical framework.[62]

The NIE team created a new data base for their analyses by establishing a number of decision rules as to what programs from the NAS data base would or would not be considered relevant to education. In creating this new data base, they examined the data NAS had classified as falling within the domain of education (one of 15 mutually exclusive social policy areas in the NAS scheme). The NIE team also added to this data base some programs NAS had categorized in four of the other mutually exclusive policy areas.[63] (Due to the mutually exclusive nature of the NAS categories, programs were classified based on their primary goals only. The NIE analysts determined that this was too restrictive a boundary for the domain of educational R&D and therefore they also examined data from four sub-categories having primary goals in other policy areas but secondary goals that placed them within the domain of educational R&D -- science education (from the policy area labelled "science and technology"); health education (from the "health" policy area); selected programs from the area of "cultural affairs"; and selected programs from the area of "employment, manpower, and training".)

The NIE analysts then modified the NAS category scheme by omitting some categories and regourping others. The decisions they made were based on their conceptions of the most useful ways of analyzing the data for the domain of educational R/D&I. Consequently, the NAS categories of "program and administrative data" and "training and fellowships" were excluded; "evaluation research" was classified under "research" rather than "evaluation activities", and "statistical research" was classified under "research" rather than "statistical activities"; "social experimentation" and "policy formulation demonstrations" were combined in a single category; and NIE was somewhat selective in including programs in the NAS category labelled "miscellaneous demonstrations". (For the rationales underlying these decisions, the reader is referred to the materials prepared by the NIE analysts, cited above.)

Table 6.8, reproduced from an article prepared by the NIE analysts,[64] shows the classification scheme used by NIE to analyze the data base by functions.[65] Under the category of "Knowledge Production", the NIE team included all research and statistical activities. The category labelled "Problem Solution" includes all evaluation activities, development of materials, policy formulation demonstrations, and selected miscellaneous demonstrations. The "Utilization" category includes all dissemination activities and policy implementing demonstrations.

B. Findings on Funding Distribution by Function

As shown in Table 6.8, nearly 60% of all federal funding of education KPU in FY 1975 was obligated to problem solution activities, while 30% went to utilization activities, and 10% (10.7% to be more precise) went to what NIE has labelled knowledge production (mostly research). Within these categories, the functions receiving the largest share of total obligations were: development of materials (21.2%); policy formulation demonstrations (21.3%), policy implementing demonstrations (19.1%), and miscellaneous demonstrations (12.7%). Research and dissemination accounted for only a little more than 10% each. Evaluation activities accounted for only 4%, but the actual proprotion spent on evaluations and evaluation-related activities is higher since evaluation

TABLE 1
FEDERAL OBLIGATIONS FOR EDUCATIONAL KNOWLEDGE PRODUCTION AND UTILIZATION IN FISCAL YEAR 1975 BY SUB-FUNCTION.

Function and Sub-Function	Dollars (thousands)	Percent
Total	$452,225	100
I. KNOWLEDGE PRODUCTION	48,508	10.7
A. Research[1]	45,541	10.1
B. Statistical activities[2]	2,967	.6
1. General purpose statistics	2,576	.5
2. Development of statistical programs	391	[4]
II. PROBLEM SOLUTION	269,416	59.6
A. Evaluation activities[3]	19,663	4.3
1. Program evaluation	13,713	3.0
2. Management evaluation	2,386	.5
3. Evaluation data	3,564	.7
B. Policy formulation demonstrations	96,462	21.3
C. Development of materials	95,967	21.2
D. Miscellaneous demonstrations	57,324	12.7
III. UTILIZATION	134,301	30.0
A. Policy implementing demonstrations	86,086	19.1
B. Dissemination	48,215	10.7
1. Publication & distribution	2,424	.5
2. Document reference & information service	7,670	1.7
3. Research synthesis	4,949	1.1
4. Technical assistance	7,921	1.8
5. Conferences to disseminate	10,080	2.2
6. Creation of dissemination networks	10,903	2.4
7. Miscellaneous	4,268	.9

Source: National Academy of Sciences, Study Project on Social Research and Development, as modified by the National Institute of Education.
[1]Sub-functions for research are not shown because for the most part they are administrative categories
[2]An undetermined amount of "statistical research" is included under research.
[3]Evaluation research totaling $1,408 is included under research.
[4]Less than .05%.

Table 6.8

Federal Obligations for Educational Knowledge Production and Utilization in Fiscal Year 1975 by Sub-Function.

funds are set aside within program funding (and also because evaluation research has been classified by NIE under "research"). Interesting to note, all categories of demonstration projects combined accounted for more than half of total education KPU funding (53%).

If recent actions taken by the National Council on Educational Research are indicative of what has happened since FY 1975 in the distribution of federal funding across KPU functions (not only in NIE but in other federal agencies as well), then analyses of current data would probably show an increase in funding for research and a decrease in problem solution activities (notably development of materials), while utilization activities probably remain at about the same level as in FY 1975.

4. Federal Funding of Educational R&D, By Agency[66] and Function

As shown in Tables 6.9 and 6.10 reproduced from one of the NIE analyses,[67] different federal agencies emphasize different KPU functions.

A. Agency Emphases in Funding of Different Functions

Examining Table 6.9 first, it can be seen that: OE emphasizes demonstrations of all kinds (nearly 69% of its FY 1975 funds were obligated to the three categories of demonstrations). NIE, however, emphasizes only one kind of demonstraton project, and does so rather heavily. Policy formulation demonstrations alone accounted for 51.5% of NIE funding in FY 1975. In addition, development of materials accounted for 23.7% of NIE funding,[68] while research accounted for 15.8%.[69] The much smaller sum obligated by the Assistant Secretary of Education was distributed across development of materials, miscellaneous demonstrations, and

OBLIGATIONS FOR KNOWLEDGE PRODUCTION AND UTILIZATION IN FEDERAL DEPARTMENTS AND AGENCIES BY KPU FUNCTION, FISCAL YEAR 1975.

		Percent distribution												
			Knowledge Production			Problem Solving					Utilization			
Department or Agency	Dollars (Mil.)	Total	Total	Research	Stat.	Total	Eval	Policy Form. Demo.	Dev Mat.	Misc. Demo.	Total	Policy Impl Demo	Diss.
TOTAL	452.2	100.0	10.7	10.1	0.6	59.6	4.3	21.3	21.2	12.7	29.7	19.0	10.7
Health, Education & Welfare	363.5	100.0	11.0	10.2	0.8	59.1	5.2	25.5	12.6	15.8	29.9	21.4	8.5
Education Division	340.0	100.0	10.1	9.2	0.9	61.0	5.2	26.4	12.4	16.9	29.0	20.4	8.6
Office of Ass't Secretary	20.6	100.0	50.5	36.4	14.1	46.2	—	1.7	22.8	21.8	3.3	—	3.3
Office of Education	245.8	100.0	4.9	4.9	0.0	57.8	7.2	20.9	8.2	21.5	37.2	28.2	9.0
Nat'l Inst. of Ed	73.8	100.0	15.8	15.8	—	75.6	0.3	51.5	23.7	—	8.6	—	8.6
Public Health Service	21.5	100.0	23.2	23.2	—	30.9	1.7	12.2	17.1	—	45.8	36.9	8.9
Other HEW	2.0	100.0	31.2	31.2	—	48.1	32.5	15.6	—	—	20.6	19.5	1.1
Department of Defense	21.5	100.0	27.2	27.2	—	72.7	—	13.0	59.8	—	—	—	—
National Science Foundation	39.9	100.0	—	—	—	57.1	—	2.5	54.6	—	42.9	11.3	31.6
Nat'l Endowment Humanities	17.3	100.0	1.1	1.1	—	83.5	—	—	83.5	—	15.4	—	15.4
Other	10.1	100.0	25.2	25.2	—	17.1	7.9	—	9.3	—	57.6	38.8	18.8

Source: National Academy of Sciences, Study Project on Social Research and Development, as modified by the National Institute of Education

Table 6.9

OBLIGATIONS FOR KNOWLEDGE PRODUCTION AND UTILIZATION FUNCTIONS BY FEDERAL DEPARTMENTS AND AGENCIES, FISCAL YEAR 1975.

Department or Agency	Total	Knowledge Production			Problem Solving					Utilization		
		Total	Research	Stat.	Total	Eval	Policy Form Demo.	Dev. Mat.	Misc. Demo.	Total	Policy Impl. Demo.	Diss.
DOLLARS (Millions)	452.2	48.5	45.5	3.0	271.0	21.5	95.5	96.0	57.3	132.7	86.1	46.6
PERCENT												
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Health, Education & Welfare	80.4	82.3	81.1	100.0	79.8	96.0	95.1	48.0	100.0	80.9	90.2	64.4
Education Division	75.2	70.7	68.8	100.0	76.9	90.7	93.0	44.1	100.0	73.3	60.5	60.4
Office of Ass't Secretary	4.6	21.5	16.5	97.8	3.5	—	0.3	4.9	7.8	0.5	—	1.4
Office of Education	54.3	25.1	26.8	2.1	52.7	89.5	53.3	21.0	92.2	68.1	60.5	45.6
Nat'l Inst. of Ed.	16.3	24.1	25.7	—	20.7	1.2	39.4	18.2	—	4.7	—	13.1
Public Health Service	4.7	10.3	11.0	—	2.5	1.9	2.7	3.8	—	7.3	9.2	4.0
Other HEW	0.4	1.3	1.4	—	0.4	3.4	0.3	—	—	0.3	0.5	0.0
Department of Defense	4.7	12.0	12.8	—	5.8	—	2.9	13.4	—	—	—	—
National Science Foundation	8.8	—	—	—	8.4	—	1.0	22.7	—	12.7	5.2	26.1
Nat'l Endowment Humanities	3.8	0.4	0.4	—	5.3	—	—	15.0	—	2.0	—	5.5
Other	2.2	5.2	5.6	—	0.6	4.0	—	1.0	—	4.3	4.6	3.9

Source: National Academy of Sciences, Study Project on Social Research and Development, as modified by the National Institute of Education.

Table 6.10

research.[70] Agencies outside of HEW heavily emphasized development of materials. (The Department of Defense obligated nearly 60% of its educational KPU funds to development work. For NSF, the figure was nearly 55%. The highest of all, 83.5%, was obligated to development work by the National Endowment for the Humanities.)

B. Dominant Sources of Funding Per Function

Table 6.10 shows how much of the federal funding for each function in FY 1975 came from each agency. Since OE's budget accounts for more than ha-f of all the federal funding of educational R/D&I, it is not surprising that OE is the main source of funds for almost all kinds of education KPU activities. Only in the cases of knowledge production (especially statistical activities) and development of materials do we fail to find OE as the dominant sponsor.

Despite OE's predominant role, there are significant differences indicated here in the sources of founding for different functions. Statistical activities, for instance, are the virtual monopoly (97.8%) of the Office of the Assistant Secretary of Education (which includes the National Center for Educational Statistics). Evaluation activities are hearily concentrated in OE (89.5%) as are policy implementing demonstrations (80.5%) and miscellaneous demonstrations (92.2%). Policy formulation demonstrations are funded primarily by OE (53.3%) and NIE (39.4%). Sponsorship of the other functions is dispersed more broadly across a larger number of agencies. Substantial proportions of the total of educational research funding, for instance, come from five agencies: OE and NIE each account for approximately a quarter of the total (26.6% and 25.7% respectively), with additional large chunks coming from the Office of the Assistant Secretary (16.5%), the Public Health Service (11.0%), and the Department of Defense (12.8%). Development of materials is also spread across five different agencies: NSF (22.7% of the development funding total), OE (21.0%), NIE (18.2%), the National Endowment for the Humanities (15.0%), and the Department of Defense (13.4%). Dissemination funding comes primarily from three agencies: OE (45.8% of the dissemination total), NSF (26.1%) and NIE (13.1%).

5. Federal Funding of Educational R&D: By Project Content, Target Group, Performer Organizations, and Agencies

A. The SRG Data Base[71]

The NAS data base we have been considering up to this point is the most complete of the existing data bases with regard to coverage of programs falling within the domain NIE has defined as educational KPU. However, these data cannot be used to answer questions about the specifics of federal funding, by problem areas, target groups, performing organizations, etc. The only data base that can shed any light on these issues is the SRG project-level data base.

a. Limitations

The SRG data do reveal a great deal about the funding emphases of different agencies. However, before we summarize some of the more important findings from NIE's analyses of these data, we should take note again, of the limitations of this data base and some of the reasons for being cautious about attempting to generalize from these data alone to statements about federal funding of educational R/D&I as a whole.

As discussed earlier, the SRG data reflect funding from only those agencies who are members of the Interagency Panels on Early Childhood and Adolescence Research and Development (and therefore no data are included from such important educational R&D sponsors as NSF, the Department of Defense or the National Center for Educational Statistics). The projects included in the data base are only ones dealing with individual learning and development and only ones dealing with the early childhood and adolescent years. The projects in the SRG data base account for only 58% of the $513 million estimated by NIE to have been spent by federal agencies on educational KPU in FY 1975. In agency-by-agency terms, that means, for instance, that the SRG data include only 79% of the activities funded by OE in FY 1975, only 62% of those funded by NIE, and none of those funded NSF. In addition, the NIE analysts established various decision rules for selecting from the SRG data base projects that met their criteria as "education KPU relevant". Only 2523 of the 3536 projects in the data base met the NIE criteria. These "education KPU relevant" projects totalled $295 million in obligations, which represented 80% of the total funds obligated by projects in the SRG data base. In short, the project data summarized below describe only 80% of the SRG data base, and account for only 58% of total federal funding for educational R/D&I.

b) Classification Scheme, as Modified by NIE

The SRG data were coded by trained coders into five functions: basic research, applied research, evaluation research, research support and utilization activities,* and policy research. Applied research was further divided into four subcategories: pilot study, development, demonstration and/or replication, and other applied research. The NIE analysts

* Research support and utilization activities are defined as "support for the planning, implementation, or dissemination of research" (but not actual data collection or analysis) "or installation of proven models."

then regroup these categories and sub-categories to make them consistent with the NIE three-way classification scheme. The resultant classification scheme is shown in Table 6.11 (reproduced from the NIE report[72]).

The skewed nature of the distribution of projects in the SRG data base should be apparent from examination of this table: according to these data, problem-solving activities accounted for 92% of obligated KPU funds, while NIE's analysis based on the NAS data base suggested that the figure should be around 60%. The discrepancy is due primarily to the fact that most utilization activities included in the NAS data base are not included among the SRG projects.

B. Distribution of Funding, By Primary Focus

The SRG category scheme for coding the primary focus of a project is shown in Table 6.12. There are eight mutually exclusive categories. Educational services is only one of these categories but it accounts for 87% of the projects selected by the NIE analysts as "education KPU relevant:. (This is not surprising since most of the projects in most of the other categories were probably excluded by NIE's selection criteria.) Within the category of educational services, the emphasis in the SRG data is clearly on elementary school and special education.

In addition to the codes for a rpoject's primary focus, the SRG coding scheme included an elaborate heirarchy of categories and subcategories describing project content. The reader is referred to the full report for a description of the various codes. What seems most relevant here is that almost all (94%) of the projects in the SRG data base selected by the NIE analysts as "education KPU relevant" were coded by the SRG analyst as "intervention programs and activities," especially interventions involving studies of the effects of various education curricula, teaching

Function	Dollars (thousands)	Percent
Total	295,041	100
Knowledge Production	17,216	6
Basic Research	17,216	6
Problem Solving	270,577	92
Applied Research	12,657	4
Pilot, Demonstr. & Replic.	182,297	62
Development	50,656	17
Policy Research	1,972	1
Evaluation Research	22,995	8
Utilization	7,248	2
Res. Sup. & Utiliz.	7,248	2

Table 6.11

Federal Obligations for Early Childhood and Adolescent Education KPU, by Type of KPU Function, Fiscal Year 1975

Primary Focus	Dollars (thousands)	Percent
Total	295,041	100
Child or Adolescent Development	14,187	5
Physical Development	1,949	1
Cognitive Development	6,481	2
Socioemotional Development	4,640	2
Other Development	1,117	*
Family	1,587	1
Neighborhood or Community Environ.	33	*
Broad Social Environment	547	*
Study of Research Methods	2,285	1
Health or Welfare Services	18,237	6
Day Care	3,788	1
Health Care	5,544	2
Protective/Advocacy Services	5,293	2
Other Services	3,612	1
Educational Services	257,531	87
Special Education	43,743	15
Early Childhood Education	5,636	2
Elementary School Education	80,555	27
Secondary Education	18,671	6
Postsecondary Education	5,548	2
Alternative Education	1,501	1
Other Educational Services	101,877	34
Juvenile Justice	633	*

* Less than 0.5 percent.

Table 6.12

Federal Obligations for Early Childhood and Adolescent Education KPU, by Primary Focus, Fiscal Year 1975 techniques, learning conditions, materials, program policies and procedures.

When one analyzes the data on curriculum projects alone (a subset of all the SRG data) some interesting patterns emerge. Nearly three-quarters of all the money for curriculum projects is obligated for pilot or demonstration projects or replications. Considerably less of the money is spent on curriculum development activities. Reading is the only academic subject area where at least 10% of project funds are spent on development work. Higher percentages of funding go into development work in non-academic areas such as environmental education, career education, vocational education, drug abuse, citizenship, and parenthood. Vocational education is the only curriculum area in which even 10% of the funds are spent specifically on evaluation activities.

C. Distribution of Funding, By Target Population

The projects in the SRG data base were also coded by two variables related to a project's target population: whether or not the population had special characteristics, and if so, what these characteristics were (e.g., bilingual, physically handicapped, mentally retarded, etc.); and whether or not the population had specific demographic characteristics (by ethnicity, economic status, or residential location), and if so, what these characteristics were.

Table 6.13 and 6.14 (from the NIE analysis) present the SRG categories and distribution of projects in terms of these categories*. Several important points are revealed by these data. Clearly, if these data are representative, more federal education KPU funds are spent on projects targetted at children with special characteristics (47%) than children without special characteristics (40%); and more federal money is targetted at children from specified demographic

* Note: Multiple coding of projects was permitted.

Population Studied (Special Characteristics)	Dollars (thousands)	Percent
Total	295,041	100
Children without Special Characteristics	116,780	40
Population Not Specified	18,654	6
Children With and Without Special Characteristics	21,571	7
Children with Special Characteristics	138,036	47
Bilingual	76,480	26
Physically Handicapped	29,045	10
Mentally Retarded	16,025	5
Learning Disabled	12,616	4
Emotionally Ill	11,794	4
Academically Slow	7,472	3
School Dropout	6,748	2
Abused/Neglected	4,931	2
Drug User	4,161	1
Gifted	1,998	1
Delinquent	1,841	1
Adolescent Parent	728	*
Runaway	108	*

Note: Sum of the special characteristics of the population studied adds to more than children with special characteristics because a project could be classified as dealing with more than one special population.

* Less than 0.5 percent.

Table 6.13

Federal Obligations for Early Childhood and Adolescent Education KPU, by Special Characteristics of Population Studied, Fiscal Year 1975.

Population Studied (Demographic characteristics)	Dollars (thousands)	Percent
Total	295,041	100
Population not Specified	118,928	40
Population Specified	176,113	60
Primarily Poor	87,113	30
Spanish-surnamed	78,195	26
Urban	58,500	20
Black	29,574	10
American Indian	25,470	9
Rural	21,963	7
White	18,236	6
Indian Reservation	8,332	3
Migrant	6,490	2
Suburban	4,917	2

Note: Sum of demographic characteristics of the population studied adds to more than population specified because a project could be classified as dealing with more than one population.

Table 6.14

Federal Obligations for Early Childhood and Adolescent Education KPU, by Demographic Characteristics of Population Studied, Fiscal Year 1975 populations (60%) than children in general (40%). Among projects for students with special characteristics, the single largest category is targetted at bilingual students (26%), followed next in size by students who are physically handicapped (10%). Only 1% of the funds are obligated to projects for the gifted; 5% to projects for the mentally retarded; 4% each to projects for learning disabled and emotionally ill; 3% to the academically slow.

In terms of demographic characteristics, more money is spent on projects targetted at urban students (20%) than on rural students (7%) suburban students (2%), students on Indian reservations (3%), or migrants (2%). More money is spent on projects targetted primarily at poor students (30%) than any other single category. And more is spent on Spanish-surnamed students (26%), essentially the same category as the bilingual students noted above, than all the other ethnic categories combined, i.e., black students (10%), American Indian students (9%), and white students (6%).

If one were to examine the data for curriculum projects only[73] (rather than all education KPU relevant projects in the SRG data base), some differences emerge in the kinds of KPU activities funded for curriculum projects targetted at different populations. For instance, the projects targetted at students with special characteristics and students from specific demographic groups are far more likely to be pilot or demonstration projects than research or development or evaluation, etc. The data on projects for students who are bilingual or physically handicapped or from specific demographic groups, for instance, shows that virtually all of these are pilot or demonstration projects. Among the groups with special characteristics, a significant amount of development work (over 25% of the projects) is carried outonly for the mentally retarded and the gifted. Among specific demographic groups, significant portions of funding for development work are found only for rural, suburban, and migrant students. Substantial funding for applied research tends to be targetted only at students who are drug users, dropouts, abused or neglected.

D. Distribution of Funding, By Performing Organization

Some of the most important findings of the NIE analyses relate to funding differences by performing organizations. They underscore the fact that a substantial amount of specialization and division of labor is to be found in educational R/D&I, despite the system's relatively immature state of development. As stated by the NIE analysts; "Each KPU function tends to be supported largely in one or two kinds of organizations, and each type of organization tends to receive a majority of its funds for only one or two functions."[74]

Tables 6.15 - 6.17 (from the NIE analysis) provide the relevant data.

As shown in Table 6.15, if these data are representative then 42% of federal funding of education KPU activities goes to LEAs, 19% goes to academic institutions (including R&D Centers) and 17% to nonprofit corporations (including regional laboratories). Only 7% goes to SEAs, 4% to other state and local agencies, and 5% to the for-profit corporations.

The specialization of performing organizations by function is shown in Table 6.16. The LEAs carry out most (66%) of the demonstration projects. Academic institutions do most of the basic research (71%) and over a third (34%) of all the applied research. The for-profit corporations carry out nearly half (49%) of the evaluation research and one-fifth (20%) of the policy research. The least specialization is found in the category of non-profit corporations who are the dominant performers of research support and utilization activities (52%), development evaluation research (27%) and applied research 29%).

Performing Organization	Dollars (thousands)	Percent
Total	295,041	100
Academic	54,912	19
Nonprofit	51,254	17
Profit	14,607	5
State Education Agency	20,776	7
Local Education Agency	123,628	42
Other State and Local Agency	11,097	4
Other	18,768	6

Table 6.15

Federal Obligations for Early Childhood and Adolescent Education KPU, by Performing Organization, Fiscal Year 1975

Performing Organization	KPU Function							
	Total	Basic Res.	Appl. Res.	Pilot, Dem. & Replic.	Devel.	Policy Res.	Eval. Res.	Res. Supp &.Utiliz.
Dollars (thousands)	295,041	17,216	12,657	182,297	50,655	1,971	22,996	7,248
Percent								
Total	100	100	100	100	100	100	100	100
Academic	19	71	34	8	33	11	21	24
Nonprofit	17	14	29	8	38	34	27	52
Profit	5	4	*	*	2	20	49	8
SEA	7	*	4	8	11	2	*	10
LEA	42	0	10	66	4	17	0	*
Other State & Local	4	5	14	3	4	12	1	1
Other	6	5	8	7	8	5	2	5

Percentages based on data appearing in appendix 2.
* Less than 0.5 percent.

Table 6.16

Federal Obligations for Early Childhood and Adolescent Education: KPU Function by Performing Organization, Fiscal Year 1975

Performing Organization	Dollars (thousands)	KPU Function (percent)							
		Total	Basic Res.	Appl. Res.	Pilot, Dem. & Replic.	Devel.	Policy Res.	Eval. Res.	Res. Supp & Utiliz.
Total	295,041	100	6	4	62	17	1	8	2
Academic	54,912	100	22	8	27	30	*	9	3
Nonprofit	51,254	100	5	7	28	38	1	12	7
Profit	14,607	100	5	*	4	7	2	77	4
SEA	20,776	100	*	2	67	27	*	*	3
LEA	123,628	100	0	1	97	2	*	0	*
Other State & Local	11,097	100	8	16	54	18	2	1	1
Other	18,768	100	4	6	65	21	*	2	2

Percentages based on data appearing in appendix 2.
* Less than 0.5 percent.

Table 6.17

Federal Obligations for Early Childhood and Adolescent Education: Performing Organization by KPU Function, Fiscal Year 1975

Table 6.17 indicates how the educational R/D&I funds received by each type of institution are distributed by function, i.e., how dependent each type of institution are distributed by function, i.e., how dependent each type of performing organization is on each function for the support of its KPU activities. Not surprisingly, given what we have seen above, LEAs are almost entirely dependent on demonstrations. For-profit corporations are largely dependent (77%) on evaluations. SEAs are heavily dependent on demonstration projects (67%), but also receive significant sums (27%) for development work. Non-profit corporations receive substantial amounts of their support for development (38%) and for demonstrations (28%). Academic institutions derive federal support for their education KPU activities from devleopment work (30%), basic research (22%), and from pilot and demonstration projects or replications (27%).

E. Agency Differences

a. By Function

As shown in Tables 6.18 and 6.19, federal agencies differ significantly in their emphases on different education KPU activities. The Public Health Service, for instance, is heavily oriented toward research: 53% of its FY 1975 oblicagions went to basic research projects, another 15% to applied research projects, and an additional 5% to evaluation research. More than 78% of all the education KPU relevant basic research projects included in this data base were funded by the Public Health Service; 30% of all the applied research projects were funded by the Public Health Service.

OE, by way of contrast, obligates most of its budget (78%) to pilot and demonstation projects and replications; the overwhelming majority (89%) of the funding for work in this

Function	All agencies	NIE	OE	PHS	Other HEW	Other Federal
Obligations ($000's)						
Total	295,041	45,457	207,889	25,328	14,828	1,541
Basic Research	17,216	854	1,167	13,295	1,497	404
Applied Research	12,657	5,662	2,086	3,756	1,128	25
Pilot, Demonstration, or Replic.	182,297	7,649	162,866	4,874	6,502	405
Development	50,656	18,205	28,287	2,140	2,001	22
Policy Research	1,972	534	1,151	0	216	70
Evaluation Research	22,995	8,110	9,660	1,220	3,448	558
Research Support and Utilization	7,243	4,443	2,671	43	34	57
Percent Across						
Total	100	15	71	9	5	1
Basic Research	100	5	7	78	9	2
Applied Research	100	45	16	30	9	*
Pilot, Demonstration, or Replic.	100	4	89	3	4	*
Development	100	35	57	4	4	*
Policy Research	100	27	58	0	11	4
Evaluation Research	100	35	42	5	15	2
Research Support and Utilization	100	61	37	1	*	1
Percent Down						
Total	100	100	100	100	100	100
Basic Research	6	2	1	53	10	26
Applied Research	4	13	1	15	8	2
Pilot, Demonstration, or Replic.	62	17	78	19	44	26
Development	17	39	14	8	14	1
Policy Research	1	1	1	0	1	5
Evaluation Research	8	18	5	5	23	36
Research Support and Utilization	2	10	2	*	*	4

* Less than 0.5 percent.

Table 6.18

Federal Obligations for Early Childhood and Adolescent Education, KPU: Funding Agency and Type of KPU Function, Fiscal Year 1975

Population Studied (special characteristics)	All agencies	NIE	OE	PHS/NIH	Other HEW	Other Federal
Obligations ($000's)						
Total	295,041	45,457	207,889	25,328	14,826	1,541
Population not Specified	18,654	1,789	4,82[illegible]	10,722	1,102	214
Children Without Special Characteristics	116,780	35,712	67,634	4,297	8,121	1,015
Both Children With and Without Special Characteristics	21,571	1,990	15,683	3,655	223	19
Children with Special Characteristics	138,036	5,966	119,744	6,654	5,380	292
Bilingual	76,840	2,449	73,454	296	640	0
Physically Handicapped	29,045	233	27,527	1,285	0	0
Mentally Retarded	16,025	233	13,424	2,367	1	0
Learning Disabled	12,616	0	11,291	1,325	0	0
Emotionally Ill	11,795	0	9,778	1,751	265	0
Academically Slow	7,473	1,343	5,220	619	56	234
School Dropout	6,748	2,024	4,068	412	0	244
Abused/Neglected	4,931	0	662	0	4,270	0
Drug User	4,161	0	324	3,837	0	0
Gifted	1,998	754	1,244	0	0	0
Delinquent	1,841	0	194	1,430	217	0
Adolescent Parent	728	0	336	151	183	58
Ru[illegible]	108	0	108	0	0	0
Percent Across						
Total	100	15	70	9	5	*
Population not Specified	100	9	26	57	6	1
Children Without Special Characteristics	100	31	58	4	7	1
Both Children With and Without Special Characteristics	100	9	73	17	1	*

(Continued)

Table 6.19

Federal Obligations for Early Childhood and Adolescent Education, KPU: Funding Agency and Special Characteristics of Population Studied, Fiscal Year 1975

Population Studied (special characteristics)	All agencies	NIE	OE	PHS/NIH	Other HEW	Other Federal
Children With Special Characteristics	100	4	87	5	4	*
Bilingual	100	3	96	*	1	0
Physically Handicapped	100	*	95	4	0	0
Mentally Retarded	100	1	84	15	*	0
Learning Disabled	100	0	89	10	0	0
Emotionally Ill	100	0	83	15	2	0
Academically Slow	100	18	70	8	1	3
School Dropout	100	30	60	6	0	4
Abused/Neglected	100	0	13	0	87	0
Drug User	100	0	8	92	0	0
Gifted	100	38	62	0	0	0
Delinquent	100	0	10	78	11	0
Adolescent Parent	100	0	46	21	25	8
Runaway	100	0	0	100	0	0
Percent Down						
Total	100	100	100	100	100	100
Population not Specified	6	4	2	42	7	14
Children Without Special Characteristics	40	78	32	17	55	66
Both Children With and Without Special Characteristics	7	4	8	14	2	1
Children With Special Characteristics	47	13	58	26	36	19
Bilingual	26	5	35	1	4	0
Physically Handicapped	10	1	13	5	0	0
Mentally Retarded	5	1	6	9	*	0
Learning Disabled	4	0	5	5	0	0

(Continued)

Table 6.19 (Continued)

Population Studied (special characteristics)	All agencies	NIE	OE	PHS/NIH	Other HEW	Other Federal
Emotionally Ill	4	0	5	7	2	0
Academically Slow	2	3	2	2	*	15
School Dropout	2	4	2	2	0	16
Abused/Neglected	2	0	*	0	29	0
Drug User	1	0	*	15	0	0
Gifted	1	2	1	0	0	0
Delinquent	1	0	*	6	1	0
Adolescent Parent	*	0	*	1	1	4
Runaway	*	0	*	0	0	0

Note: Because projects could be classified as dealing with more than one special characteristic, the column entries do not add to the total.

* Less than 0.5 percent.

Table 6.19 (Continued)

category comes from OE. OE is also the dominant sponsor of policy research 58%), evaluations (42%), and development work (57%). However, NIE contributes a significant share of the funding of these activities as well: in FY 1975, NIE obligated 27% of the policy research funds, 35% of the evaluation funds, and 35% of the development funds.

NIE's FY 1975 budget was distributed across all the various funcitons. The largest single category was development (39%), followed by evaluation research (18%), pilot/demonstation projects and replications (17%), applied research (13%) research support and utilization (10%), basic research (2%), and policy research (1%). NIE was the dominant sponsor (61%) of research support and utilization; OE also contributed a significant share (37%) to this type of activity. The only other function to which NIE contributed the dominant share was applied research: in FY 1975, NIE accounted for 45% of federal funding for applied research in education.

b. By Target Groups

OE is the dominant sponsor of projects targetted at populations with special characteristics: more than half of the funds targetted at these groups comes from OE alone. More than one-third of OE's educational KPU budget is obligated for bilingual projects, and another one-tenth of that budget goes to projects for the physically handicapped.

OE is also the main sponsor for projects targetted at specific demographic populations: more than half of the project funding for each specific demographic group comes from OE alone. Most of OE's education KPU funding (70%) is committed to projects targetted at specific demographic groups; this compares to only one-third of NIE's budget so committed. The two agencies differ not only in their extent of commitment to specific demographic groups, but also which specific groups are the focus of each agency's attention. OE projects emphasize the poor (37% of the total OE ubdget for education KPU), Spanish-surnamed (35%), and urban students (21%). To the extent that NIE projects emphasize any particular demographic populations, the NIE emphasis is on students in urban areas (15% of the obligated funds) and rural areas (14%).

c. By Performing Organization

Federal agencies also differ in the degrees to which they tend to fund different categories of performing organizations. Since OE's share of the total federal budget ofr education KPU is so large, it tends to be the dominant source of funds for all types of institutions. But even so, there are significant differences in the patterns that emerge in the data on agency funding of different types of education KPU performers.

As shown in Tables 6.20 and 6.21, based on FY 1975 data, LEAs received almost all (97%) of their KPU support from OE, and nearly three-fifths (59%) of OE's KPU budget went to LEAs. Similarly, SEAs received almost all (89%) of their federal support for KPU from OE (another 11% came from NIE).

Academic isntitutuions received nearly half (44%) of their educational R/D&I support from OE, another quarter 22% from NIE, and another quarter (26%) from the Public Health Service. (More than half, 56%, of the Public Health Service budget went to academic institutions.)

Non-profit corporations were funded heavily by NIE (43%) and OE (38%). The NIE figures indicate that nearly half of that agency's FY 1975 budget went to non-profit corporations. But it must be understood that the non-profit category includes

Population Studied (demographic characteristics)	All agencies	NIE	OE	PHS/ NIH	Other HEW	Other Federal
Obligations ($000's)						
Total	295,041	45,457	207,889	25,328	14,826	1,541
Population not Specified	118,928	30,257	62,972	16,781	8,420	497
Population Specified	176,113	15,200	144,915	8,547	6,406	1,044
Primarily Poor	87,113	3,298	77,536	2,760	2,838	680
Spanish-surnamed	78,195	1,567	72,601	2,126	1,878	23
Urban	58,500	6,841	43,353	4,314	3,724	267
Black	29,574	1,041	21,030	3,918	2,997	588
American Indian	25,470	1,085	20,496	2,913	975	0
Rural	21,963	6,477	13,242	956	1,153	135
White	18,236	824	12,239	2,824	1,987	362
Indian Reservation	8,332	0	7,613	314	404	0
Migrant	6,490	0	6,370	0	120	0
Suburban	4,917	514	2,908	713	782	0
Percent Across						
Total	100	15	70	9	5	*
Population not Specified	100	25	53	14	7	*
Population Specified	100	9	82	5	4	*
Primarily Poor	100	4	89	3	3	.1
Spanish-surnamed	100	2	93	3	2	*
Urban	100	12	74	7	6	*
Black	100	4	71	13	10	2
American Indian	100	4	80	11	4	0

(Continued)

Table 6.20

Federal Obligations for Early Childhood and Adolescent Education, KPU:

Funding Agency and Demographic Characteristics of Population Studied, Fiscal Year 1975

Population Studied (demographic characteristics)	All agencies	NIE	OE	PSH/NIH	Other HEW	Other Federal
Rural	100	29	60	4	5	1
White	100	4	67	15	11	2
Indian Reservation	100	0	91	4	5	0
Migrant	100	0	98	0	2	0
Suburban	100	10	59	14	16	0
Percent Down						
Total	100	100	100	100	100	100
Population not Specified	40	67	30	66	57	32
Population Specified	60	33	70	34	43	68
Primarily Poor	30	7	37	11	19	44
Spanish-surnamed	26	3	35	8	13	1
Urban	20	15	21	17	25	17
Black	10	2	10	15	13	38
American Indian	9	2	10	12	6	0
Rural	7	14	6	4	8	9
White	6	2	6	11	13	23
Indian Reservation	3	0	4	1	3	0
Migrant	2	0	3	0	1	0
Suburban	2	1	1	3	5	0

Note: Sum of demographic characteristics of population studied adds to more than population specified because a project could be classified as dealing with more than one population.

* Less than 0.5 percent.

Table 6.20 (Continued)

Type of Performing Organization	All agencies	NIE	OE	PHS/NIH	Other HEW	Other Federal
Obligations ($000's)						
Total	295,041	45,457	207,889	25,328	14,826	1,541
Local Educational Agency	123,628	2,105	120,204	1,307	12	0
Academic Institution	54,912	11,918	24,314	14,021	4,078	581
Nonprofit Institution	51,254	22,225	19,686	4,247	4,926	170
State Educational Agency	20,776	2,241	18,269	20	245	0
Profit Institution	14,607	2,160	8,635	466	2,623	722
Other State or Local Agency	11,097	4,507	3,434	1,738	1,417	0
Other	18,768	301	13,347	3,529	1,525	68
Percent Across						
Total	100	15	70	9	5	*
Local Educational Agency	100	2	97	1	*	0
Academic Institution	100	22	44	26	7	1
Nonprofit Institution	100	43	38	8	10	*
State Educational Agency	100	11	88	*	1	0
Profit Institution	100	15	59	3	18	5
Other State or Local Agency	100	41	31	16	13	0
Other	100	2	71	19	8	*

(Continued)

Table 6.21

Federal Obligations for Early Childhood and Adolescent Education by Funding Agency and Type of Performing Organization, Fiscal Year 1975

Type of Performing Organization	All agencies	NIE	OE	PHS/NIH	Other HEW	Other Federal
Percent Down						
Total	100	100	100	100	100	100
Local Educational Agency	42	5	59	5	*	0
Academic Institution	19	26	12	56	28	38
Nonprofit Institution	17	49	9	17	33	11
State Educational Agency	7	5	9	*	2	0
Profit Institution	5	5	4	2	18	47
Other State or Local Agency	4	10	2	7	10	0
Other	6	1	6	14	10	4

* Less than 0.5 percent.

Table 6.21 (Continued)

the regional education laboratories (just as the "academic institution" category includes the R&D centers), to which NIE has been (for a variety of reasons we shall consider later) heavily committed. The for-profit corporations have received nearly three-fifths of their support (59%) from OE and another 15% from NIE.

The large chunk of the funding of for-profit corporations coming from OE might at first glance seem attributable to the fact that most evaluation activity is funded by OE and most evaluations are carried out by the for-profit corporations. However, even when the type of KPU function is held constant, the data show significant differences among federal agencies in their orientations toward different categories of performing organizations. For instance, in the data on funding agency of basic research alone, the NIE analysts found that 73% of NIE's basic research money went to non-profit corporations; no other agency obligated more than 14% of its basic research funds to non-profit corporations. In applied research, NIE obligated 43% of its funds to academic institutions while OE gave only 18% of its applied research funds to academic institutions and funnelled one-fifth of its applied research money to LEAs and SEAs. The pattern of differences continues within development funding, with NIE giving more of its support to non-profit corporations while OE support was oriented toward LEAs and SEAs. Evaluation funding shows agency differences as well: the Public Health Service divided its evaluation money half and half between academic institutions and non-profit corporations; NIE gave more than two-thirds of its evaluation funding to non-profit corporations. As one final example, the NIE analysts pointed to the data on sponsorship of demonstration projects: while OE obligated 72% of this money to LEAs, NIE distributed its demonstration funds over several types of organizations, with no one organizational type accounting for more than a quarter of the funds.

Through all of these data, we find (among other things) clear differences between the funding preferences of OE and NIE, with OE oriented toward funding KPU activities in LEAs, while NIE funding is channelled heavily to non-profit corporations especially, and also to academic institutions. It would be useful to have the data on regional laboratories and on the university-based R&D centers separate and apart from the data on other non-profit corporations and other academic institutions, since NIE's special relationship to the labs and centers has not been an entirely voluntary preference. (We shall return to this point later.) However, in the absence of this separate data we must simply take note of NIE's heavy orientation toward the non-profit organizations in general, and leave to subsequent analyses a puzzling out of the meaning of this finding.

d. Summary

To sum up the key differences between OE and NIE in the funding of educational R/D&I activities, the NIE analyses indicate that:

> NIE primarily supports development, evaluation, and applied research projects directed at children in general performed by non-profit and academic institutions.
>
> OE primarily supports demonstration projects for children with special characteristics performed by local education agencies. 75

Clearly, then there are significant differences in federal agency funding of different educational R/D&I activities, and any attempt to formulate "federal" funding policies for education KPU -- on a coordinated system-wide basis (as one would expect, for instance, from a lead agency or a coordinating body such as the Federal Council on Educational Research and Development -- must be based on an understanding of all of the sources of educational R/D&I funding and their impact on total system functioning.

6. Funding Data From the Organizational Survey of NIE's Education KPU Monitoring Program

The NIE analyses of the NAS and SRG data bases are useful primarily to provide an understanding of federal funding of education KPU activities. These data bases tell us nothing about data from non-federal sources of KPU activities. These data bases tell us nothing about data from non-federal sources of KPU sponsorship. Nor do these data permit us to relate funding data ~~to~~ such other variables as organizational histories, staffing, number of types of projects, etc. These data bases do not include information on any of these other variables.

We will be in a better position to address some of these questions shortly when the data from NIE's organizational survey become available[76] and when researchers are able to carry out various secondart analyses on the data. Among the questions that can be examined based on these data are the following:

What are the distributions of funds, staff, and projects among organizations, and how are these distributions related to each other?

To what is educational R&D concentrated in a few organizations? To what extent is it concentrated across, and within, individual sectors (academic, non-profits, for-profits, SEAs, LEAs)? What are these large organizations? What special characteristics do they share other than size?

What proportion of R&D is carried out in organi-ations whose primary mission is education? What are the primary missions of the other organizations (e.g., urban planning, health)?

To what extent is educational R&D carried out in organizations which specialize in R&D and consulting work? To what degree do these organizations focus specifically on educational R&D, as compared to R&D focused on other social areas and R&D in science and technology?

What are the major sources of funds for the system, and how does their importance vary among sectors? What is the extent of diversification of sources? Are there groups of organizations or portions of sectors which are highly dependent on particular sources? If yes, which sets of organizations and which sources?

To what R&D functions are funds applied? Are there sector "specialties"? Are some functions found more often in large than in small organizations, suggesting perhaps minimum size requirements for some kinds of work? Can variations be detected between funds sources and types of functions performed, for the whole system or parts of it?

What is the extent to which organizations span many R&D functions? What is the extent to which organizations specialize in particular functions?

What proportion of total funds are applied to different education levels, e.g., adult and continuing education? To what degree is work focusing on a particular level shared among sectors? Can clustering by funds sources be detected? Are there noteworthy dependencies upon single source of funds?

What is the distribution of full-time and part-time staff? Is it congruent with what would be expencted on the basis of distribution of financial resources? Are there differences by major sources of funds or by degree of dependency on a single source?

Of educational R&D professional, how many are from inority groups? How many are women? Are variations in proportions of professionals in an organization who are women of from minority groups related in any way to funding sources?

How are staff distributed in terms of primary R&D functions? Is this congruent with the distribution of funds? What implications can be drawn about different relative costs, by sector and organizational size, for various types of work?

What is the distribution of doctorates in the professional work force? Are there variations with regard to substantive functional R&D emphases of the employing organizations? Are there systematic variations related to funding sources?

What is the total number of projects reported and their typical size? Do projects tend to be larger in some sectors than in others? Do large organizations tend to work on large projects? Can patterns be found linking project sizes and funding sources?

Clearly, then, we are well on the way to an understanding of the funding of educational R/D&I as it is distributed currently -- who, is spending how much, for what kinds of work, carried out in what types of institutions? However, these data are of relatively little help in guiding our thinking about how funding <u>should</u> be distributed, or what the <u>effects</u> of different funding policies have been (or might be in the future) on sustem capacities, functioning, and outputs. Questions of the latter kind have been the subject of intense debate in recent years. We turn to some of these hotly debated issues now, so as to develop a sense of the kinds of questions in need of consideration as a basis of policy development and perhaps too the kinds of information we need to collect and analyze in the future to provide some guidance for the development of funding policies for educational R/D&I.

IV. FUNDING POLICY ISSUES

Funding policies of key sponsors are of critical importance to any R/D&I system, for determining what kinds of work are carried out and by whom, what capacities are and are not developed and where, and often, at what rates of development. In the field of education, funding policies taken on even greater importance because funding is virtually the only strategy used by sponsors to affect the system. Few other potential forms of leadership are exercised. We shall have more to say about this later.

We have selected four particular funding policy issues to focus on here, as illustrative of the ways funding policy decisions can shape system development. For each, we examine the issue that was raised (and why and how it was raised), the available options, and the course of action taken. We also speculate about some of the contextual factors that affected the way the particular issues were raised and the decisions that were made.

1. Institutional Support vs. Program Purchase

A. The Issue

Should federal agencies maintain a special relationship of support for selected institutions, so as to insure the availability of certain needed system capacities? Or, should all performing organizations be treated equally by federal agencies, selecting desired programs and services for purchase from these performing organizations on the basis of open competition? These were some of the key questions underlying the debate over "institutional support" vs. "program purchase," the focus of considerable attention from the early '70s until only around three years ago.

B. Historical Background

Central to the circumstances out of which the issue arose and under which it was eventually laid to rest (for a time at least) was the history of the labs and centers and general dissatisfaction with the quality of work produced by many of these institutions. Since their creation, the labs and centers had been funded by OE as institutions. A single budget was requested by and committed to each institution, to support work proposed by each institution at (or near) a funding level requested by each institution. The funding provided by OE paid for not only the direct costs of carrying out the specified programs proposed to produce specified outputs, but also the indirect institutional costs required to establish and maintain the organizations as institutions. (There was some variation in patterns since the R&D centers were subunits of academic institutions while the regional laboratories were autonomous institutions with no other sources of institutional support. But still, in both cases, OE was providing institutional support and not simply purchasing particular programs or services.)

What was unique about the relationship between OE, on the one hand, and the labs and centers, on the other, was: (a) the assumed commitment by OE to maintaining these organizations as institutions; (b) OE's funding of the institutional agendas they proposed; and (c) the funding of their work under non-competitive procedures that kept these programs separate from the funding of other field-initiated proposals, and derived their funding from what in essence amounted (more or less in different years) to a budget set-aside for the labs and centers.

No other educational R/D&I performing organizations were created in this unique fashion. But then, no other educational R/D&I performers had been created by the federal government to provide the field of education with specific capacities that were viewed as existing in insufficient quantity at the time the labs and centers were created.

It has been assumed when the labs and centers were created that federal funding for educational R/D&I would expand in an orderly manner and that within a few years there would be approximately $100 million available in federal funding to support these institutions at a level sufficient for high level work at all of them. However, since this funding expansion did not occur, federal education policymakers made a series of decisions between 1968 and 1970 that brought an end to federal support for some of these institutions so that more adequate levels of funding would be available for those remaining institutions judged to be stronger and better able to use these resources to produce quality work. Consequently, nine regional laboratories and two R&D centers lost their funding during these years. (Others lost their funding in subsequent years, but that gets ahead of our story.)

The termination decisions created enormous problems for OE as well as for the labs and centers. Each decision was made on an ad hoc basis, with no comprehensive policy or explicit set of standards to guide decision making. Dissatisfaction with this situation was a strong impetus for the development of what became the new program purchase policy. The new policy was traceable to the perception of other dilemmas as well. As described in the OE document formulating the new policy:

> The previous policy has been characterized by many as one of attrition or, worse, destructive competition. The survival of the most promising programs has required

> the midcourse termination of other, less promising ones. The resulting attrition has led to a lowering of morale, decrease in prestige and insecurity among remaining institutions, all of which must be reversed if the program is to be strengthened and the initial investment capitalized upon.[77]

Also, it was felt that the time had come for such a policy, given the number of years these institutions had been in existence. The National Institute of Child Health and Human Development, for instance, had already switched over to a policy for the 12 research centers on mental retardation they had established during the '60s.[78]

Beyond that, it was felt that a comprehensive policy was needed that could provide some guidance on the establishment of new institutions as well as making funding decisions on existing decisions.

C. <u>The New Policy, as Formulated by OE in 1972</u>

The key objectives of the new policy were to:

- provide for the starting of new institutions when necessary;
- allow a greater control over federal resources while at the same time recognizing the autonomy of those R&D institutions that have grown to maturity;
- provide programs with target completion dates;
- assure stability for multi-year funding blocks; and
- delineate a mechanism whereby institutions can broaden their base of support.[79]

The policy was intended to cover the full range of possibilities, from (a) the founding of new institutions to attack new problem areas (or to replace existing institutions judged to be doing an inadequate job), to (b) the support of existing institutions assessed as either "developing" or "mature" in status. The model used in the program descriptions emphasized the concept of <u>institutional maturity</u>. Based on assessments of an institution's maturity level, an institution supported under this policy would move toward greater and greater autonomy from monitoring and review by Washington. And with greater maturity, the funding arrangements would shift from <u>core support</u> (i.e., institutional support) to <u>program support</u> (i.e., program purchase).

The rationale for this policy was that new institutions needed, for a time at least, a certain amount of nurturance and protection. They would, therefore, be supported in special ways for a few years, until more mature patterns of functioning and support could reasonably be expected of them. New institutions were to receive "core support," (defined as support for "the cost of operating the institution irrespective of the work that is being done").[80] Institutions whose proposals were accepted for a planning grant might receive such a grant for a 3 - 6 month period. Upon successful review of the completed plans, a new institution was recognized and the institution proceeded through a three phase "maturation" process. During Phase I (which might last up to a maximum of two years), core support was provided. If at least one of the program plans carried out in Phase I was judged by an external review panel to provide evidence that the institution was worthy of further support, the institution entered into Phase II and again received core support for a maximum of two years.

If the Phase II review indicated that the institution was able to adequately manage its program plans, it passed into Phase III "mature" status. Phase III differed significantly from the previous stages in that a Phase III institution was highly autonomous from agency direction whereas in Phses I and II agency staff worked closely with the institutions to guide them along and monitor their operations. Institutions which achieved Phase III status (some might be so designated from the outset, some might achieve it only after passing through Phases I and II, and some might never achieve it) had a moral commitment to multi-year funding of their program plans, and were not subjected to close agency monitoring. If a mature institution had proposed a plan for a 7-year R&D program, let us say, and this program had been accepted for funding, the institution could be reasonably certain that it would receive the requested funding for the 7-year period so long as the quality and progress of work in that program was judged to be satisfactory. "Only when there is cause to suspect that the program is in need of outside intervention will the agency take the initiative for assessment. . . . To maintain Phase III status, the institution must maintain its reputation for doing quality educational R&D work."[81]

Phase III institutions would not receive core support, but instead received program support, i.e., support for the conduct of specific programs. In addition, mature institutions were eligible to receive two additional budget line items: independent research funding on a cost-reimbursable basis (up to a maximum of 8% of direct program costs), and a management fee (generally up to a maximum of 3% of direct program costs) to cover business expenses not generally covered by direct program costs and to permit a cash reserve to accumulate "to provide operational stability during temporary fluctuations in contract support and while contracts are being renewed."[82]

In essence, then, the new policy seemed to provide a mechanism for selecting quality R&D performers (labs and centers, or other existing or newly created institutions) to have a "special relationship" to OE (and then NIE), assured of multi-year commitments to accepted program plans and autonomy in operation without close monitoring from Washington, so long as the quality of their work continued high. The policy also seemed to provide specific decision points and criteria for terminating funding to institutions not able to provide sufficient evidence of a potential for quality work.

However, inherent in this new policy were a number of significant issues on which there were likely to be significant disagreements between the agency and the performing organizations, and some significant implementation problems. Many of these were pointed out in an internal document prepared by Ward Mason,[83] who had played a key role in managing OE's R&D Center Program and later became the lead of NIE's R&D System Support Division. We take note here of some of the issues raised in that internal document.

D. Questions Raised About the Policy and Its Implementation

a. Implementation Problems

Ward Mason's analysis pointed out a host of implementation problems likely to be encountered if the policy were to be put into effect for the FY 1973 budget cycle as proposed. These problems included such matters as: the timing of the assessment of institutions in relation to the FY 1973 budget cycle; the essential (rather than optional) nature of the proposed management fee and independent research funding if the regional laboratories were to remain financially viable institutions;[84] the difficulties laboratories would have in carrying out "cost-reimbursable" independent research since they had no independent source of funds to use while waiting to be reimbursed; the increased costs of the new policy, many of which did not seem to be taken into account in the FY 1973 budget planning (e.g., the costs of phasing out programs and institutions to be terminated, and the costs of providing the proposed management fees and independent research funding to the labs and centers); and the lack of attention in the proposed policy to the need for an NIE unit to be concerned about the labs and centers as institutions, to coordinate the functioning of program monitors located in different program units of NIE and to be concerned with the impact of individual program decisions on the functioning of these organizations as institutions.

In addition, and of more central interest to us, the Mason document raised questions about the reasonableness of some of the fundamental assumptions underlying the new policy.

b. Assumptions About How Long It Should Take for Institutions to "Mature"

The new policy assumed that after seven or eight years of operation the various labs and centers were (with a couple of possible exceptions) ready to be judged as mature institutions. However, the preliminary results coming in from the panels reviewing the plans of these institutions were suggesting most strongly that they were generally not meeting the established criteria of maturity. Therefore, the new policy was creating a decision situation in which many of the labs and centers would probably be terminated despite the significant past investment in them, or else a tentative commitment would have to be made to try to nurture them and bring them along to the point of maturity so as to fulfill the government mandate to build an educational R&D infrastructure. The only other possibility would be to terminate many of the existing labs and centers and to try to build the mandated infrastructure by starting over again with new institutions.

Perhaps, given the state of development of educational R/D&I, the weak knowledge and technology base on which it rested, and the inadequately developed institutional and personnel base through which it had to function, the new policy was based on unrealistic expectations. Perhaps in other fields after seven or eight years of existence R&D institutions should be ready to be judged on the criteria established for "mature" status. In education, however, this may simply have been naive, and a bit unfair.

c. <u>The Need for In-Place Capability: Balancing Flexibility and Continuity</u>

One advantage of the program purchase policy was assumed to be the flexibility it could provide in shifting funds as priorities changed. Instead of committing funds to the maintenance of institutions with specific areas of expertise, even after these areas of expertise were required to carry out work desired by funding agencies, the funds could be shifted to institutions with other areas of specialization and expertise required by the agency's new priorities.

However, the price of this flexibility might be a loss of continuity, and especially a loss of specialized capabilities that might be needed at some future time. What happens, Mason asked, to the institutions who successfully complete their work and then lose their funding to other institutions oriented toward the newer priorities of the agency? In all likelihood, they would lose their staff, and go out of existence, and their specialized capabilities would be lost and unavailable for future use when they might be needed again.

The key question, then, becomes: "Is NIE willing to pay anything for the maintenance of in-place capability in major mission areas of educational R&D?"[85] If this is answered in the affirmative, it would suggest the need for some alternative (or supplement) to the program purchase approach.

E. The Program Purchase Policy: Adopted, Then Reversed

When NIE came into existence, the program purchase policy had already been put into effect by OE, and NIE continued the policy. As a consequence, between 1972 and 1974 four laboratories and two R&D centers went out of existence. However, within the next two years, the labs and centers were able to develop sufficient lobbying strength through CEDaR (the Council for Educational Development and Research) to get the program purchase policy reversed (or at least modified) by

Congressional action, and to insure that the labs and centers would be funded through a set-aside in NIE's budget. In part, this has meant funding of program plans proposed by these institutions; in part it has meant that certain programs desired by NIE have been funded through competitions open (at least in their initial phases) to labs and centers only (e.g., NIE's R&D Exchange Program). But clearly, whatever the funding mechanism, the "special relationship" between NIE and the labs and centers has been acknowledged, even if NIE had to be dragged kicking and screaming into this special relationship to maintain certain in-place capabilities.

F. <u>The Program Purchase Policy and the Context of Education R/D&I Policymaking</u>

What the history of this issue seems to underscore is: (a) the potency of the political process in key areas of educational R/D&I funding; (b) the powerful constraining role of history on policy options open to even the lead agency in a given sector; (c) the extent to which funding policy decisions must take into account questions of institutional capacities and the impact funding decisions are likely to have on institutional capacities that will or will not be developed, and will or will not be available for future use; and (d) the extent to which capacity must be understood in terms not only of institutional capacity but <u>system</u> capacity as well. We shall have more to say about all of these points.

2. <u>The Campbell Report</u>

A. <u>The Issues</u>

The Campbell Report addressed itself to several interrelated issues: Should NIE maintain a "special relationship" to certain R&D performers? If so, should these institutions be the labs and centers? How should NIE select the R&D performers who carry out its work, through open competition or through some form of sole source procurement? What are likely to be the effects of these alternative procurement approaches on the available supply of system capacity for high quality work? How should NIE carry out its role as lead agency for educational R&D?

B. <u>Historical Background</u>

The Campbell Report was produced as the result of a three-month review by an impressive panel of consultants chaired by Roald Campbell. The panel was asked by NIE's then-Acting Director, Emerson Elliott, to examine NIE's funding policies, with "special attention" to the labs and centers. The key concept in the charge to the panel was that of needed <u>capacity</u> to do high quality work. The panel was asked to assess existing capacity for high quality work, how the existing level of capacity might have been affected by past funding policies, and how it might be affected (especially how it might be improved and expanded) by alternative funding policies in the future. Elliott's charge to the panel also took note of NIE's legislative mandate to build an effective R&D system, and therefore indicated that the funding policy questions being raised were to be considered in terms of their effects on the functioning of the nation's education R&D system.

The appointment of the Campbell panel was a response to intense pressures on NIE to clarify its stand on the labs and centers and the program purchase policy it had inherited from OE. It was widely known that some NIE staff and key advisers were unhappy with the general quality of work produced by most of these institutions and would have liked very much to terminate the existence of many of the weaker institutions. However, CEDaR, the lobbying arm of the labs and centers, was making headway with Congress and it appeared likely that NIE might have to deal with them in terms of a "special relationship," whether or not this was what the Institute viewed as appropriate. The question of concern, as posed in Elliott's charge to the panel, was as follows: Given the scarcity of funding, it was likely that the labs and centers

> will not receive NIE funds equal to past levels of Federal support (i.e., their capacity will be under-utilized by NIE). . . The question then arises whether capacity not now being utilized by NIE and other funding sources under their current priorities is of such value to the education community that it needs to be preserved through extraordinary efforts.[86]

C. The Panel's Assessment and Recommendations

The Campbell panel's review and recommendations covered four areas of interest to us: (1) their assessment of existing R&D capacities; (2) their recommendations with regard to the labs and centers; (3) the procurement strategies they recommended NIE use to identify and contract with the R&D performers best able to do quality work; and (4) their recommendations as to the manner in which NIE should carry out its role as lead agency for educational R&D.

a. Existing Capacity

The OE formulation of the new program purchase policy was premised on the assumption that an adequate degree of institutional capacity existed for the system to carry out needed work. However, the Campbell panel assessed existing capacity as inadequate in quantity and uneven in quality.

The existing personnel base was described as inadequate in sheer numbers, in comparison to other field, in relation to the federal R&D agenda that had been projected, and in light of the large, decentralized, fragmented operating system to be impacted. The panel also suggested that there were some deficiencies in quality as well, and therefore called for incentives to attract "the very best quality of people" to educational R&D.

Their examination of the distribution of personnel by functions suggested the need for greater balance of personnel across functional areas, especially more dissemination specialists and a better distribution of developers into SEAs and LEAs as well as specialized R&D organizations.

The panel's assessment of the institutional base of educational R/D&I included some interesting observations on the strengths and weaknesses of the various types of performing organizations carrying out educational R/D&I activities. We shall return to this shortly. Of particular interest to us was their appraisal of the extent to which there was an interrelated educational R/D&I "system." The fragmented, disorganized, nebulous nature of the configuration that they found was a cause of some concern to the panel, and we shall consider this point below.

b. The Labs and Centers

The most controversial portion of the Campbell Report was the panel's somewhat negative assessment of the quality of the labs and centers and their recommendations with regard to reducing the number of such institutions to be supported and transforming those that were to receive future support from regional into "national" laboratories.

The laboratories, in particular, were criticized as "a patchwork of capacities and interests. . .of very diverse quality with respect to any specific capacity," weak in need identification, weak in marketing, weak in quality control, producing products that are "not demonstrably better than the range of commercially-developed materials, and frequently more expensive," generally "perceived by important practitioner groups. . .as distant, unhelpful." Though still impressed by the laboratory concept as a sound one, "we must hasten to add that at present the concept is out of control and being implemented in unsatisfactory ways, and that there are still too many institutions (given the shortage of quality R&D personnel) to insure the uniformly high quality of work originally hoped for."[87]

The group's recommendations revolved around their preference for "a smaller set of high quality institutions" conceived of as "national laboratories" -- few in number (no more than six), oriented toward a national rather than regional research agendas, organized around clear missions related to NIE's priorities, provided with stable three to five year funding of approximately $3 million to $4 million a year per institution, largely from a single source (NIE), with limits on the extent to which they could seek funding from other sources (to make certain that their mission focus was not diluted), with close ties to the world of practice but protected against having to provide services to LEAs or SEAs unless these were closely tied to a given institution's mission focus.[88]

c. <u>Procurement Strategies: Sole Source vs. Open Competition to Identify and Fund "Those Who Can Best Do NIE's Work"</u>

In recent years, strong pressures have been exerted by Congress and other sources to insure that (as much as possible) government contracts are awarded on the basis of open competition. The motivation behind this, clearly, is to avoid the kinds of abuses that have at times cropped up in the awarding of government contracts. However, the use of open competition for procurement assumes that there is an adequate supply of quality performers out in the marketplace for government contracts and that if NIE were simply to make known its needs for particular kinds of work it would receive proposals and bids from among a large supply of qualified contractors.

The significance of this issue at the time the Campbell panel was at work was twofold. First, NIE had already been planning to "diversify the performers of NIE's R&D activity" through open competitions, not restricted to the labs and centers or necessarily to any other particular types of performer organizations. And second, if the Campbell Report's recommendations for "national laboratories" was accepted and if the competition for designation as a national laboratory was open to all types of institutions and not restricted to existing laboratories or R&D centers, then the procurement approach used to identify and select the new national laboratories would have far-reaching implications.

The panel criticized the use of open competitions in response to RFPs on several grounds:

It is not always true that agency staff can write clear and useful specifications for what is wanted, particularly if the work stems from a planning process where the agenda was drawn up by national experts from outside the Institute.

The costs of bidding are eventually added to the government's cost in future procurements, so a high rate of bidding and the accompanying high rate of unsuccessful proposals is in the long run drawing funds away from performance of the work. Where there are only a few good performers for a given type of work, the rest of the competitors have little chance. and their costs of failure are a drain on energy and time that might have been avoided. Further, the cost to the government of reviewing a great many proposals is not always reflected in superiority of the final product as compared with the quality obtainable under more limited competition.

Extensive competition among a small number of organizations capable of large-scale work in education R&D may tend to promote disintegration and professional secrecy within the group-- negative results to be avoided if possible.

Where proposals are judged by Institute staff, the current procedure prevents them from working with proposers to look at ideas or to review advance copies of proposals so as to avoid submission of obviously unresponsive or unqualified ones, or better, to strengthen marginal ones.[89]

Researchers who examined the competitive process in a slightly different field, social program evaluation research, commented how competition failed to produce quality, and in fact quite the contrary.[90]

They further noted how poor the communication channels have been between NIE and potential contractors -- how little advance information is available to potential contractors about competitions, and how poor NIE's information is about potential contractors, even on the basic level of adequate mailing lists. In addition, they pointed to the fact that a number of potentially highly number of institutions (rather than relying on piecemeal competitions"); and of the need for NIE to "take on vigorous analysis and leadership tasks with respect to the overall education R&D effort in the nation".[93]

> It was the initial intention, and we think a very good one, that NIE be the agency of the Federal government not only for supporting programs, but also for developing policy with respect to educational research and development. NIE does not, and need not, have in its budget all the Federal government's dollars spent in support of education R&D. But it should have enough of the total amount to be a balancer, to bring about coordinations and integration among the Federal programs....
>
> However, NIE seems at present to give practically no attention to the planning and coordination of the entire national effort in education R&D.... NIE should have sufficient staff at a sufficiently high level that it can develop both an informational and an analytic overview and understanding of what is going on in the Federal government and outside, what the key issues and accomplishments are, what the key problems and failures are. Its role in these respects should be intellectual and its approach should be to lead by force of analysis and intelligence rather than to lead by dictating. Its influence over policy in the Federal government would come primarily from the depths of its knowledge and the imagination of its proposals rather than from bureaucratic power. Its impact on research elsewhere will similarly depend on the quality of data, insight, and analysis, but also on aggressive publications, and professional contacts by credible members of NIE staff....
>
> ....So long as the nation's R&D capacity is as limited as we think it is, every bit of intelligence used in thinking through how to use it best will be well-spent. In the political arena, too, a well-thought-out position commands respect, even if not agreement, NIE can lead the Congress much more forcefully than it has, with strong data on

number of institutions (rather than relying on piecemeal competitions"); and of the need for NIE to "take on vigorous analysis and leadership tasks with respect to the overall education R&D effort in the nation".[93]

> It was the initial intention, and we think a very good one, that NIE be _the_ agency of the Federal government not only for supporting programs, but also for developing policy with respect to educational research and development. NIE does not, and need not, have in its budget all the Federal government's dollars spent in support of education R&D. But it should have enough of the total amount to be a balancer, to bring about coordinations and integration among the Federal programs....
>
> However, NIE seems at present to give practically no attention to the planning and coordination of the entire national effort in education R&D.... NIE should have sufficient staff at a sufficiently high level that it can develop both an informational and an analytic overview and understanding of what is going on in the Federal government _and outside_, what the key issues and accomplishments are, what the key problems and failures are. Its role in these respects should be intellectual and its approach should be to lead by force of analysis and intelligence rather than to lead by dictating. Its influence over policy in the Federal government would come primarily from the depths of its knowledge and the imagination of its proposals rather than from bureaucratic power. Its impact on research elsewhere will similarly depend on the quality of data, insight, and analysis, but also on aggressive publications, and professional contacts by credible members of NIE staff....
>
> ....So long as the nation's R&D capacity is as limited as we think it is, every bit of intelligence used in thinking through how to use it best will be well-spent. In the political arena, too, a well-thought-out position commands respect, even if not agreement, NIE can lead the Congress much more forcefully than it has, with strong data on

> gaps and needs in educational research and development....
>
> We conclude that NIE has not yet taken on its rightful role as intellectual leader of education R&D.[94]

To permit NIE to play such a leadership role, the panel viewed as essential "a very sophisticated research and analysis unit at the very top of NIE", with active involvement in the short-term and long-term planning and decision making carried out by the NIE Director's Office. As envisioned by the panel, this unit would have sufficient resources to permit them to monitor and analyze system functioning and to provide the data base for "informed choice". (The panel characterized the current R&D System Support Division's effort to function in this manner as inadequately funded and insufficiently involved in top NIE planning and decision making -- through no fault of their own, we might add.)[95]

In addition, the panel suggested the creation of a special advisory group of "experts on science and R&D" to assist the NCER in policy making and to provide additional input on the work carried out by the R&D System Monitoring and Analysis Unit they had recommended.

> Such a double input would give the Council both expert staff work and analysis, and also some reflection on its meaning for policy by a small group which could build up substantial insight if allowed and encouraged to persist over several years.[96]

We consider this "lead agency" issue in some detail below in our discussion of the CISST policy analysis on Agency-Field Relationships.

D. The Campbell Report: Debated and Shelved

The Campbell Report was submitted in August 1975 and immediately became the focus of debate over a number of interrelated issues: the "regional" vs "national" laboratory concept, the idea of institutions with "special relationships" to NIE, and the question of whether such institutions with "special relationships" should be restricted to the labs and centers or whether instead their selection should be opened widely to "diversify" the R&D performers receiving substantial NIE support. To a lesser extent, there was some discussion of the degree to which agency procurement should reflect the sole source approach or more open competition via the RFP route. Oddly enough, the active "lead agency" role called for by the panel received little if any attention in the debate that ensued over the Campbell Report. . .

As was to be expected, the labs and centers were most concerned about the panel's recommendations, for they foresaw another round of cuts paring down their numbers to fewer still. CEDaR continued actively to lobby on behalf of the existing labs and centers, and especially to insure their "special relationship" to the Institute through an NIE budget set-aside. And CEDaR lobbying effectiveness was becoming increasingly evident.

Within a year of the submission of the report, it, the issues it had raised, and the recommendations it included, appeared to be dead and buried. CEDaR and the organization's Congressional allies had won the battle of the FY 1976 budget appropriation for NIE. The majority of funds appropriated for NIE that year were earmarked by Congress, for the labs and centers and for specific projects of interest to Congress, leaving relatively small sums to NIE's discretion. A second factor at work here was the appointment of a new NIE Director, Harold Hodgkinson, who was more sympathetic to the point of view of the labs and centers, having come from one of these institutions himself. The word was passed down that the Campbell Report had been shelved, and with it the notion of "national" laboratories. The security of the labs and centers was assured, along with their budget set-aside.

Some time later it became clear that the "special relationship" notion had come to be shelved too, along with the recommendation that there be less open competition among potential contractors and more sole source procurement of the services of "those who can best do NIE's work." Although interest in assessing "organizational capability" to carry out R&D continued for some short time longer, as evidenced by a thoughtful paper[97] and an exploratory study,[98] both commissioned by NIE's R&D System Support Division, this interest, too, was shelved a short time later.[99]

For a while there seemed to be some support for strengthening the functioning of the R&D System Support Division and its planned Education KPU Monitoring Program, so that, perhaps, it could carry out the role of the research and analysis unit envisioned by the Campbell panel. This Division had even been given the go-ahead to issue an "R&D Source Sought" call for the creation of a Center for Education R&D System Studies, and proposals were received from R&D performer organizations with an interest and some capabilities in this area.[100] However, no such center was created, the Education KPU Monitoring Program has not received funding for any data-gathering activities beyond the organizational survey begun in 1976, and the R&D System Support Division remains a small, undersupported, relatively isolated group within the NIE structure. And, NIE is no more active as a lead agency for education R&D than it was in 1975 before the Campbell Report was submitted. It even appears to us, as we shall note shortly when we discuss the CISST Agency-Field Relationships analysis, that the Institute's leadership has seemed uncomfortable with the idea of assuming an active lead agency role and unwilling to reorient the agency's style to take on such an active position in the workings of educational R/D&I in this country.

E. The Campbell Report and the Context of Educational R/D&I Policymaking

We noted earlier in our discussion of what happened to the program purchase policy of OE and then NIE that the political process had powerful roles to play in determining the outcome of a system policy debate. Clearly, we have here another instance of the potency of the political process -- for the effectiveness of CEDaR lobbying was as powerful a force in shelving the Campbell Report's recommendations as in reversing the program purchase policy.

The fate of the Campbell panel's recommendations illustrates some other important elements in the context of educational R/D&I policymaking as well, for instance: (a) the "stop-and-start-anew" effect on policy development of changing NIE Directors and leadership (a problem which has continued); and (b) the tendency to commission analyses and reports by individuals or groups selected for their specialized expertise, and then to ignore their recommendations and even to bury the analyses on which the recommendations were based. As a result of these circumstances, there appears to be little that could be characterized as an ongoing debate informed by an "institutional memory." Rather, what we seem to see over and over again is a continuing recycling of the same debates over the same issues every few years, without even much of an elevation of the level on which the debate is carried out.[101] We shall have more to say about this immediately below as we turn to consider the CISST analysis on Agency-Field Relationships in the Educational R/D&I System.

3. Agency-Field Relationships in the Educational R/D&I System

A. The Issues

- What is the proper balance between field-initiated and NIE-directed work?

- Should a specific percentage of NIE's budget be set aside for the funding of field-initiated work (and if so, what percentage)?

- What are the most appropriate mechanisms for procuring field-initiated and NIE-directed work?

- How should NIE relate to the field? How should NIE relate to other agencies which sponsor educational R&D, those who carry out educational R&D activities, and those who use the outputs of educational R&D?

- What are NIE's responsibilities toward U.S. education in general and educational R&D in particular? How narrowly or broadly should the Institute construe its mission as the "lead agency" for educational R&D in this country?

- How can NIE utilize a very limited budget for the best short- and long-term effects?

B. Historical Background

a. Complaints from the Research Community

By the summer of 1976, NIE had been receiving intense criticism from a number of quarters -- not only the labs and centers who felt their existence threatened, or Congressional critics who were disappointed in NIE's leadership and accomplishments to date and in educational R&D more broadly. In addition, NIE had been attacked severely by the research community, who felt betrayed by the institution they had expected to function in their interests, channelling funds to quality research and elevating the prestige of the field. Instead, NIE's budget woes led the Institute's leadership to eliminate funding for field-initiated research entirely in FY 1975 and to provide relatively insignificant sums for the research community in other years. Contrary to NIE becoming the NSF or NIH for research relevant to education, the research community found itself far worse off under NIE than it had been when OE was dispensing educational research funds under the Cooperative Research Program.

The severely limited amount NIE made available for field-initiated research was only part of the problem as perceived by the research community. Researchers had assumed they would have an active role in developing the Institute's research agenda and planning research programs, and that they would be actively involved in the project/program selection and review process through appointments to advisory and review panels (as had been the case to a considerable degree under OE). The research community also assumed that esteemed members of their ranks would likely be represented on top levels of the Institute's staff, in temporary appointments as staff fellows, and through appointments to the National Council on Educational Research, NIE's policymaking body. Instead, they found themselves (with a few exceptions) not only outside the ranks of the chosen few advisers with whom NIE staff did seem to consult, but, even worse, appalled at the calibre of the researchers and supposed experts who were appointed to these various groups.

Perhaps most galling of all to the research community, an increasingly sizeable chunk of NIE's work seemed to be procured by means of RFPs which tended to make many of the more capable researchers rather unhappy. Although the caricature is probably not entirely fair to all RFPs issued by the agency (and possibly not even to most of them), the RFPs were characterized as: (a) written largely by young, inexperienced NIE staff, with few credentials for the planning of vast research or R&D programs and with relatively little input from the leadership of the research community; and (b) the RFPs themselves tended to be highly specific, not only in defining the questions to be addressed but also the designs, methods, and procedures to be used and even the contents of the reports to be submitted. The complaint of the field was that such RFPs turned creative researchers into mere technicians to carry out work designed by relatively inexperienced NIE staff members. Even worse, according to the complaints, at least some of the work was poorly conceived and/or poorly designed. Although the RFP process permitted the proposal writer to submit an alternative design viewed as more adequate, there was a good chance that the alternative proposal would be viewed as exciting and interesting but unresponsive to the RFP. As if this were not bad enough, prestigious scholars were "turned off" by the responses required by the RFP, demanding an often huge investment in time and resources over a very brief period (perhaps two to three weeks or even less from the time the documents were reveiwed until the proposals had to be typed, signed off by levels and levels of university bureaucrats, and received in Washington in the hands of a proposal clearinghouse officer who time-stamped them on receipt and turned away any received even five minutes after the official deadline).

The complaints from the research community, then focused on two issues. One was the level of funding for field-initiated research, a level which researchers viewed as inadequate but seemed to be on the increase to meet those complaints. More intensely felt was the issue of developing a more appropriate mechanism for procuring work, which, from the perspective of the research community, was not necessarily the RFP, and certainly wasn't the RFP used as extensively as it had been by NIE in its few brief years of operation.

Data gathered by NIE staff tend to confirm some of the general impressions held by the field on what was happening to the funding of research and R&D under NIE. The two mechanisms through which field-initiated (or largely field-initiated) activity has been funded by NIE have been competitive grants and unsolicited proposals.

Examining first the data on competitive grants, in FY 1973 NIE awarded 206 research grants amounting to a total of over $11,000,000. In FY 1974, only 73 grants were awarded under the same "Grants for Research in Education" program, totalling nearly $4,000,000. In addition 9 grants were awarded to school systems developing local problem-solving strategies (total value approximately $1,000,000) and 9 grants were awarded for interpretive studies in educational R&D (total value, nearly $250,000). In short, the total sum awarded for research grants of all kinds by NIE in FY 1974 was less than half of what it had been the previous year. And even worse, in FY 1975, no research grants were awarded.

The only grants given in FY 1975 were awards to state education agencies to build their capacity for carrying out dissemination activities. Additional State Dissemination Grants were awarded in FY 1976. Beyond that, an estimated $2,750,000 in research grants was to be awarded in the remainder of 1976, in the NIE program area of Basic Skills and Education and Work.[102] The trend, then, excluding the SEA grants for dissemination capacity building, was for an $11 + million sum for research grants in FY 1973 to be cut in half for FY 1974, and to be eliminated altogether for FY 1975, with an estimated sum approximately half of the FY 1974 figure to be awarded in the remainder of FY 1976.

The picture was even more bleak for unsolicited proposals. In 1973 and 1974 together, a total of 611 unsolicited proposals were received, of which only 13 (2%) were funded, totaling slightly over $1,000,000 in value. In FY 1975, no unsolicited proposals were even accepted. All were mailed back. In FY 1976, prior to the January 31, 1976 deadline for the first cycle of awards, 155 unsolicited proposals were received, of which 7 were funded, and another 172 were received prior to the May 31, 1976 deadline, which had not yet been acted on at the time these data were gathered.[103] Clearly, hundreds of researchers were being turned down by NIE, possibly in part because of the quality of the proposals submitted, but also no doubt because of the severely restricted sums made available to fund work through this procurement mechanism. It is no wonder, then, that the research community came to perceive the message being sent out by NIE as "No researchers need apply here."

Table 6.22 underscores some of these points -- the decline in funding of research grants, from 11.4% of the Institute's program budget in FY 1973 to 2.7% in FY 1975 (with the FY 1975 and 1976 entries accounted for entirely by the State Dissemination Grants Program); the lack of funding for unsolicited proposals in FY 1975 and FY 1976 and the severely limited funding for these proposals in even the FY 1973-1974 period;[104] and the attempt to be responsive to the complaint of inadequate funding for field-initiated research by providing what were estimated to be substantially larger outlays for competitive grants and unsolicited proposals in the subsequent budget cycles.[105]

Tables 6.23, 6.24, and 6.25 confirm the impression of the field that NIE was relying increasingly on RFPs calling for NIE-directed work, and decreasing the awarding of grants (which generally permitted researchers a great deal more autonomy in both the planning and conduct of the work.)[106]

In Table 6.23, column C data are for contracts and column G data are for grants. The data suggest that the overwhelming majority of funding is of the NIE-directed type and that there was an increase in NIE-directed procurements from 70.5% of program funds in FY 1973 to 87% in FY 1976.

	Competitive Grants	Unsoliciteds	Program Funds
FY 73 %	11,400,000 11.4	0	100,300,000
FY 74	5,135,323 8.3	1,010,055 1.6	62,171,156
FY 75	1,713,830 2.7	0	62,890,841
FY 76	3,963,330 6.4	0	62,290,949
WEDGE	3,550,000* 20.5	586,446* 3.4	17,300,000
FY 77	7,010,000* 9.0	1,000,000* 1.3	78,300,000*
FY 78	14,311,000* 11.7	L: 5,400,000* 4.4	122,000,000*
FY 78	14,626,000* 10.5	H: 6,000,000* 4.3	138,900,000*

* Estimated

Figures include continuations.

It should be noted that the figures on 73-76 do not include all awards made through grants competitions since contracts were awarded to for-profit organizations which competed successfully in these competitions.

Table 6.22

Contracts vs. Grants

	C	G	Total
FY 73 %	70,500,000 70.5	29,800,000 29.5	100,300,000
FY 74 %	47,496,000 76.4	14,675,000 23.6	62,171,000
FY 75 %	54,820,000 87.2	8,071,000 12.8	62,891,000
FY 76	54,177,796 87.0	8,113,153 13.0	62,290,949

Table 6.23

	Competitive Contracts*	Competitive Grants	Non-Competitive Contracts (sole source)	Non-Competitive Grants**	Total
FY 76	20,892,789	3,963,330	33,285,007	4,149,823	62,290,949
% of Program Funds	33.5	6.4	53.4	6.7	
FY 75	13,024,146	1,713,830	41,795,629	6,357,236	62,890,841
% of Program Funds	20.7	2.7	66.4	10.1	
FY 74	10,498,570	5,135,323	36,997,213	9,540,050	62,171,156
% of Program Funds	16.9	8.2	59.5	15.3	
FY 73	1,800,000	11,400,000	68,700,000	18,400,000	100,300,000
% of Program Funds	1.8	11.4	68.5	18.3	

All figures include continuations.

* includes RFPs, awards to for-profit organizations under grants competitions

* includes unsoliciteds (in 74 and 76) and solicited non-competitive grants

Table 6.24

	New Starts				Continuations	
	Competitive Contracts	Competitive Grants	Non-Competitive Contracts	Non-Competitive Grants	Modification of Ongoing Contracts & Grants	Total
FY 76	6,657,674	832,173	12,011,892	721,309	42,067,901	62,290,949
% of Program Budget	10.7	1.3	19.3	1.2	67.5	
% of New Starts	32.9	4.1	59.4	3.6		
FY 75	7,469,072	1,115,525	2,655,064	2,830,488	48,820,692	62,890841
% of Program Budget	11.9	1.8	4.2	4.5	77.6	
% of New Starts	53.1	7.9	18.9	20.1		
FY 74	6,153,000	5,118,000	2,015,957	1,657,043	47,227,000	62,171,000
% of Program Budget	9.9	8.2	3.2	2.7	76.0	
% of New Starts	41.2	34.2	13.5	11.1		

Budget Figures on this detail are not available for any other years.

Breakdown according to New Starts vs. Continuations

Table 6.25

Table 6.24 shows the increase in use of RFPs (column 1, "competitive contracts") from 1.8% of the FY 1973 program funds to 33.5% of FY 1976 program funds, with an accompanying decline in competitive grants from FY 1973 to FY 1975 (and then an increase in FY 1976). One of the particularly interesting points underscored by this table is the huge chunk of NIE's budget allocated through sole source procurement, ranging from a high of 87% in FY 1973 to a low of 60% in FY 1976. This category includes the budget set-asides for the labs and centers and other funds earmarked by Congress for special programs. It also includes continuation funding for programs already in progress. This was particularly important in FY 1973 when programs were transferred in toto from OE, with their continuation funding mandated by previous OE decisions and contractual obligations. NIE succeeded in wittling down this sum somewhat over the next few years, and a number of programs were either completed or terminated by NIE within a year or so, freeing up larger sums for NIE discretionary use.

However, even when the data are analyzed separately for continuation funding vs. new starts, as in Table 6.25, we find in FY 1976 heavy reliance on non-competitive (i.e., sole source) contracts, even among the new starts, and decreasing use of the competitive contract (i.e.. RFP) approach. It is not clear, however, to what extend these FY 1976 data reflect an effort by NIE to be responsive to the complaints against RFPs, or simply heavy Congressional earmarking of the FY 1976 budget, including new starts as well as continuations. We assume the latter.

b. NCER Call for Staff Work to Support Policy Development on FIS

By mid-1976, the NCER had decided that the time had come to develop a policy on field-initiated research and on appropriate mechanisms for procuring NIE's work. In addition to its desire to be responsive to complaints from the research community about the specificity of RFPs, Council members were aware of criticisms of overly directive procurement in two analyses that had just become public -- one, an NAS report assessing Social and Behavioral Science Programs in the National Science Foundation,[107] the other a paper produced as part of the ongoing NAS study on social R&D calling for maximum freedom for the field in conceptualizing and designing research.[108] There were other factors at work as well. Council members had been expressing some concern about the amount of NIE staff time spent on researching and writing RFPs given the fact that the field could probably do the required conceptual and design work as well or better. And beyond that, given the Congressional earmarking of more than 25% of NIE's budget for the labs and centers and the specification of field-initiated program planning by these institutions, the development of an Institute policy on field-initiated studies and procurement strategies for this work came to be seen increasingly as a matter of considerable importance.

c. NIE Staff Work

Staff members of the NIE planning unit had been working for some months on an analysis of the field-initiated studies (FIS) issue and had produced a number of highly useful draft documents.[109] Of particular value in these materials were: the definitions they provided of the range of types of functioning included under the FIS rubric; the arguments they summarized for and against FIS, for and against NIE-directed work; their analysis of how NIE procedures oriented the staff toward the ready use of RFPs, in part because of the cumbersome nature of the procedures required to establish a grants competition; information they gathered about strategies in use to involve the field in NIE planning and program functioning; and data they gathered on NIE funding through grants and contracts. We have already considered the funding data. Before continuing, it might be useful to summarize some of the other points in the staff analysis.

i. Definition of FIS

The NIE planning staff defined FIS in terms of the extent of control exercised by each of three groups in the conceptualization and design of work carried out under agency funding. These three groups were: (a) the NIE staff; (b) the principal investigators who actually executed particular pieces of work; and (c) the "field" more broadly conceived, i.e., "including practitioners, public interest groups, etc., as well as researchers."[110]

They then described two ways in which the FIS issue could (and probably should) be understood: (a) "narrow FIS", which is how FIS is generally conceived, focusing on the role of the principal investigator in conceptualizing and designing a piece of research; and (b) "broad FIS", in which attention is focused on the role of the "field" (broadly conceived) in the planning and review of NIE-funded work.

In their analysis of narrow FIS, they provided a particularly useful description of the ways in which the role of the principal investigator can vary "from total control over the conceptualization and execution of the project to very little." (a) Unsolicited proposals provide the purest form of FIS, allowing maximum autonomy to the principal investigator who conceptualizes the project, determines what the questions are to be studied, designs the work, and executes it. (b) Grants competitions within NIE-defined program areas provide a considerable amount of autonomy to the principal investigator, but place one limitation on the proposed work in that it must fall within the NIE-defined set of problem areas to be funded under the specific competition. (c) RFP design competitions restrict the principal investigator somewhat further in that the RFP issued by NIE defines not only the problem area but also the specific questions to be studied. The principal investigator does, though, have complete autonomy in the design of a project to answer those questions. (d) Highly specific RFPs represent the far end of the continuum, offering little if any creative freedom to the principal investigator. Such RFPs may specify sample size, instruments to be used, etc. They may range in specificity, from only a few particular design requirements, to "a point where (theoretically) no aspects of the design are left up to the principal investigator."[111] FIS traditionally is understood to include only (a) and (b) above, i.e., unsolicited proposals and grants competitions.

In considering "broad FIS", the focus of attention is on what points in the planning and project execution cycle the broad "field" should be involved and the nature of the inputs to be provided (i.e., how much clout the field's inputs should carry). The field might be involved at such stages as: (a) general policy development and long-range planning; (b) general program planning; (c) planning specific procurements; (d) review of proposals; (e) execution of projects (through roles on advisory committees, for instance); and (f) evaluation of results.[112] The issue the NIE staff was struggling with here was how the agency might better relate to the field, a point we shall consider more fully below.

ii. Arguments For and Against FIS and NIE-Directed Work

The staff analysis summarized some of the arguments made for and against each mode of procurement.

The key arguments in favor of FIS include the following: (a) The best minds in the field are not likely to respond to RFPs, and, therefore, without FIS their talents would be lost to NIE. (b) The NIE priority program areas represent only some of the educational problems an agency might want to attack. Since all other procurement is carried out within these program areas, FIS is necessary to make certain that good ideas and strategies outside these areas are not excluded from the possibility of support. (c) Basic research questions, by their very nature, are most likely to come from work in the field, and basic research has been the source of many of the most significant influences on education in the past fifty years. Such work, also, should not be excluded from the possibility of NIE support. (d) Similarly, the field is most likely to be in the best position to judge the directions in which the growth of the field should go. And (e), a side-effect of funding basic research by top scholars in the universities is that a portion of this money is likely to be channelled to the support and training of graduate students who will assist their professors in the research and then be able to carry out additional research of their own in the future.

There are a number of other arguments, though, to be made against NIE investing too heavily in FIS, especially when FIS funding is equated with the funding of basic research (as was generally the case in the thinking of the basic research community). (a) Basic research entails a high degree of uncertainty. It is difficult to know which areas of basic research will have a payoff, and little of the basic research that is funded is likely to produce visible payoff. (b) NSF, NIH, and NIMH already fund much basic research that is relevant to education. And (c) educational problems are generally interdisciplinary in nature while basic research tends to be carried out within individual disciplines, focused on questions derived from the internal logic and needs of individual disciplines. One might question, then, whether or not the funding of discipline-based research is the most effective way to attack educational problems, which are derived from the demands of operational reality and are generally interdisciplinary in nature.

The arguments against FIS would seem to suggest the advisability of investing more heavily in NIE-directed work, and a number of other arguments have been made in favor of this mode of procurement: (a) NIE is an agency with a Congressionally mandated set of missions, accountable to Congress in terms of those missions. Most basic research is not specifically directed toward those missions. (b) It may be that one of the key roles to be played by the field is to facilitate and refine problem definition in a manner that satisfactorily reflects the diverse perspectives of different constituencies in the broad field. This requires, according to this argument, a degree of orchestration by a central agency, and therefore can probably best be done by NIE staff, who are least likely to have a stake in any one perspective and who can therefore best synthesize the diverse inputs from the field in reasonably unbiased solicitation RFPs. (This latter argument seems somewhat weak to us because of its tie to the drafting of RFPs, but we shall have more to say in favor of the orchestration notion below).

There are some obvious arguments against NIE-directed work through RFPs, and we have noted these already. (a) RFPs tend to "turn off" the best minds in the research community and turn them away from doing NIE's work. And (b) the researching and drafting of RFPs tend to absorb enormous amounts of staff time, which seems especially inefficient since the required tasks could probably be done as well or better by the field.

In determining whether the FIS or RFP approach should be used for a specific procurement, an excellent recommendation was included in the staff analysis. For more routine tasks, where the problem is clearly understood, the most effective strategies for tackling it already known, etc., an RFP might be the appropriate approach to procurement. However, for work in areas where the problem is least well understood, where there is a lack of conceptual clarity and lack of a clear understanding of what strategies will or will not work, a larger role for creative thinking from the field would seem to be essential.

iii. NIE Procedures

The staff analysis noted several internal NIE problems that might account for the low level of funding of field-initiated work. There was no separate office handling grants or unsolicited proposals. Therefore the awarding of funds required the approval of personnel from a program area, and program personnel could be expected to be somewhat reluctant to part with funds they had anticipated spending on work they had planned in order to fund proposals coming from outside the Institute. The procedures for establishing grants competitions were so cumbersome and the RFP procedures so much easier that the staff tended often to use the RFP even when they recognized that a grants competition might be more suitable for a particular procurement. And finally, the contracts officers tended to pressure the program staff for maximum specificity in procurements, with highly specific RFPs receiving the most sympathetic hearing. The staff suggested a number of steps to overcome these difficulties -- set-aside funds for grants and unsolicited proposals, establishing separate NIE units to administer these funds, having these proposals reviewed by advisers from outside the agency, etc.[114] We need not be concerned with these matters here.

iv. Approaches to Involving the Broad Field

The NIE staff described a number of approaches currently being used (or planned for future use) to involve the broad field in NIE planning and work. These included: (a) holding agenda-building conferences to establish priorities within program areas; (b) establishing advisory panels; (c) sending NIE program officers on trips around the country to talk to people in the field; (d) convening conferences to enable invited participants to react to issues papers detailing planned RFPs; (e) mailing out a draft RFP for comments by the labs and centers who would be involved in this closed competition; (f) establishing peer review panels to review proposals received for grants competitions; (g) requiring contractors awarded particular pieces of work to consult with the field and/or set up and use advisory panels throughout the life of a project; and (h) bringing together a group of consultants to evaluate a design produced by a sole source contractor, and to suggest improvements in the design.[115]

4. <u>The Commissioning of CISST's Policy Analysis</u>

At the time this NIE staff work was being carried out, our group was under contract to NIE's R&D System Support Division to: (a) develop an analytical framework that could facilitate identification and analysis of R&D system issues; and (b) illustrate the utility of this framework by carrying out two short-term (60 days each) policy analyses on issues selected jointly by NIE and CISST. The NIE planning unit suggested two policy issues which were of particularly vital and pressing concern to its staff, and these were agreed to as the issues to be tackled. The FIS question was one of these issues.[116] The analysis we produced was described at great length in a document entitled <u>Agency-Field</u>

Relationships in the Educational R/D&I System: A Policy Analysis for the National Institute of Education.[117]

The two specific issues of concern were described as: (a) determining the appropriate balance between field-initiated and NIE-directed work; and (b) determining the most appropriate mechanisms for procuring field-initiated and NIE-directed work.

In thinking about these questions, we were struck by the rather fundamental and broad-ranging implications of the questions raised, especially when viewed from the perspective of R&D system requirements. In order to deal with the procurement questions NIE had raised, in a way that seemed meaningful to us, it seemed to us that there were some critical prior questions to be addressed and clarified. Therefore, we proceeded to reformulate the questions of interest to the Institute in a manner that we felt would best permit us to shed some light and suggest some directions for policy development.

The analysis proceeded from recognition of two defining features of NIE's character as a sponsor of educational R/D&I activity: (a) NIE is a mission-oriented R&D agency; and (b) NIE is the lead agency for federal activity in educational R&D. Given that role, NIE's funding policies should be understood in terms of the agency's purposes as these impact on the total educational R/D&I system.

We were aware that many researchers unhappy with the current pattern of NIE procurements were suggesting that the Institute should commit itself to a predetermined percentage of NIE's budget for field-initiated work. The expectation was that such a predetermined set-aside formula would create a larger flow of funds into field-initiated work (especially basic research) than had previously been the case.

However, our perspective suggested that predetermined set-aside formulas were not the most reasonable approach to the problem. What the balance of different types of funding should be and how an agency should relate to the field with which it worked would depend on the purposes the agency was trying to achieve. The agency's behavior would have to be fitted to whatever it was necessary for the agency to do if it were to achieve its various purposes, in a particular field, with particular needs; operating at a particular level of maturity and readiness to take on certain kinds of work.

There were, then a number of prior questions to be considered, involving clarification of the agency's purposes and the extent to which it was prepared to carry out all or only some of its legislative mandate. As we saw it, what NIE acts on as its mission will determine its budgetary priorities and also how it should and could relate to the field.

The essence of the issue, as reformulated by the CISST team, was: How does NIE achieve its purposes, through procurements and other agency actions, taken in consort with and as part of the field?

In a second meeting with NIE staff, we sketched our reformulation of the policy issue, our rationale for this reformulation, and the analytical framework we intended to use to carry out the analysis. With a go-ahead from the NIE staff, we proceeded to develop and draft our analysis. We summarize some of the key points below.

C. The CISST Analysis

a. Systems Perspective

A key premise of the CISST analysis is that the institutions and personnel involved in the production and utilization of educational R/D&I outputs form a "system" and not just an unconnected "configuration" of entities. Despite the looseness and inadequacies of the educational R/D&I system, what is done in one area or in relation to one issue will likely have impact on other areas and have impact on other issues. Acceptance of this premise does not deny that there is only a weak link or integration between institutions which should be more closely related and whose goals might show more coherence. Nor does the "system" usage need to imply a monolithic, centralized network. But there are very significant implications for long-term planning and monitoring and for the development of initiatives by a federal agency that do come from a "systems" perspective. Most particularly, the perspective permits a proper concern for system capacity building and maturation.

The mission context from which NIE operates, the functions which constitute R/D&I systems, the current developmental state of educational R&D, and the sociopolitical environment of education and educational R&D are central analytical elements on which this systems perspective focuses. NIE's mission and its various activities are viewed in terms of their impact on the educational R/D&I system's health, functioning, and outputs.

b. Immaturity of the Educational R/D&I System

A key assumption of the analysis is that the educational R/D&I system at present is in an immature state of development. Symptoms of the immaturity of the system are evident in: (a) the significant gaps in functional specialization; (b) the weakness of the existing institutional and personnel base; (c) the weakness of the field's technology base; (d) the underdeveloped state of mechanisms for information flow and quality control; (e) the lack of consensus on standards for judging the quality of educational R/D&I outputs; and (f) the poor quality of much of the work carried out and the outputs produced. A central task of the analysis is to determine what this suggests about the appropriate roles to be played by a lead agency with a legislative mandate to build "an effective R&D system" and what changes in agency behavior might be called for over time as the system matures and capabilities in the field are better developed.

c. Vulnerability of the System to Environmental Influences

NIE's approach to carrying out its system-oriented responsibilities must take into account not only the state of maturity of the educational R/D&I system but also the political, value-laden, social-science-based nature of education. As we have noted in other chapters in this volume,[118] education is highly vulnerable to social and political influence. It tends to have diffuse goals that are subject to value judgments and controversy. These goals are difficult to specify, to measure, or to use as standards against which to evaluate school system performance. The level of public concern about school system functioning is high and educators tend to have more problems than other professionals in claiming the kinds of specialized expertise that might legitimate their actions and insulate them from public scrutiny. Therefore, substantial clarity about NIE's missions and purposes is essential, and agency actions should be oriented toward improving the environment in which educational R/D&I functions as well as supporting the functioning and healthy development of the educational R/D&I system.

d. <u>Multiplicity of Purposes</u>

Central in determining NIE's proper modes of behavior must be the mission-derived purposes the agency is trying to achieve. From a systems perspective, the agency's purposes can be grouped into three categories: (a) supporting the production of <u>substantive outputs</u> (i.e., knowledge, products, services, etc.); (b) <u>system capacity building</u> (i.e., strengthening the field's institutional and personnel base and required linkages among institutions, functions, etc.); and (c) <u>affecting</u>

the system's environment (i.e., enhancing its support, prestige, legitimacy, etc.).

Procurements tend to be thought of primarily in terms of these categories, i.e., the direct purchase of R/D&I activities to generate knowledge, produce programs or products, or provide services. Occasionally, agencies procure capability-building activities directly, as in the provision of institutional support, or the funding of training programs or fellowships. But for the most part, procurements are designed and managed by agency personnel as individual projects or programs designed to produce specific outputs.

What tends to be overlooked is the extent to which these manifestly single-purpose procurements tend to have multi-purpose implications. In almost every procurement (or other agency behavior), more than one of these purposes will be involved, whether implicitly or explicitly. Thus, the award of a grant to an R&D institution to support a specific project may also have an impact on that institution's capacity to perform in the future (e.g., by permitting it to hire additional personnel, by providing more experience to personnel and more opportunity for the sharpening of skills and the accumulation of relevant knowledge).

Consequently, it becomes essential for an agency to be very clear about its purposes, those entailing system building and affecting the system environment as well as the use of system capacity to produce substantive outputs. And too, it seems important to develop some recognition of the legitimacy of latent as well as manifest purposes for procurements as well as other agency actions.

i. Manifest and Latent Purposes

The legitimacy of latent as well as manifest purposes of agency actions is a point that merits some elaboration. The manifest reason for supporting a particular project may have little relevance to the real reason, which is latent, implicit, and infrequently made clear to members of the R&D community and/or relevant publics. A particular project may receive funding not so much because of the immediate payoff expected from the project itself but rather because of the support it is providing for a certain type or group of graduate students, or because it is expected that if a certain particularly talented researcher is supported long enough he is bound to make very substantial contributions to the field. In such cases, defending a project in terms of its manifest purpose may be difficult, but justifying it in terms of long-term capability-building needs may be much less of a problem. Or to consider a somewhat different example, an agency may be subjected to considerable pressure to support a particular kind of program, and the pressure may be substantial enough to jeopardize achievement of important objectives. In such a case, an agency may have little interest in the manifest purpose of a project, but may support it for the latent purpose of relieving undue stress on the system.

The essential point here is that procurements may provide the greatest long-range payoff if they are designed with multi-purposes in mind, and if agency personnel can design them creatively to serve latent as well as manifest purposes. What would seem to be needed, then, are deliberate agency strategies to capitalize on the multiplicity of consequences from specific agency actions, to maximize possible gains and minimize possible costs from potential multiple and interaction effects across the latent and manifest purposes of given procurements.

ii. Interaction Effects

The issue of interaction effects is one of the most critical points overlooked in the development of agency policies. Once an agency comes to view its behavior in terms of interactions among seemingly discrete actions, an entirely different kind of understanding emerges of the potentially far-reaching systemic implications of individual decisions and policies. Different purposes can interact with one another, with procurement mechanisms, or with the conditions characterizing the state of development of a particular R&D system. For instance, use of an RFP vs. a grants competition vs. funding unsolicited proposals can have major implications for long-term system capacity-building, attracting certain researchers and institutions and turning off others. Or, to consider the maturity of a system at a particular time, a strategy that may have been ineffective a decade ago might be highly successful in achieving certain purposes now or ten years from now, assuming certain aspects of system functioning have been strengthened.

The point is perhaps made most clearly by examining potential interaction effects among purposes, both within a single procurement and across all the procurements made by an agency. A procurement can lead to the development of a set of products that are so well received that they have the side-effect of improving the system's environment. Or, the products might be judged to be so poor (or so offensive to particular segments of the environment) that the side-effect is a further deterioration of the system's environment. Or, to take another example, a series of procurements could either expand or constrict certain types of system capacity, depending on which institutions are and are not funded to carry out what types of work. (For instance, the universities have been complaining that the large proportion of funding going to the non-profit and for-profit corporations is destroying some of the academic sector's capacity to function effectively in carrying out educational R/D&I activities).

When one examines patterns of agency actions across procurements -- i.e., when one considers potential interactions among the discrete procurements that make up an agency's "portfolio" -- interactions of an even less obvious nature become apparent. Across programs, the outputs may reinforce each other (synergistic effects). Or, they may counteract each other in the manner of what might be called "antipurposes" -- i.e., taking a specific action in pursuit of one purpose may make more difficult the achievement of another purpose. (The use of RFPs to procure certain kinds of research, for instance, might well have anti-purpose effects if a by-product is turning off the best research talents, suggesting to them that research funding in the field of education is unlikely to be forthcoming with untenable constraints). Such effects may be immediate in their interaction or observable only in lagged and in second- or third-order manifestations. If an agency decides to design procurements that are deliberately multi-purpose in nature, it becomes essential for agency personnel to have a clear understanding of the kinds of procurement "add-ons" that tend to be congruent vs. incongruent, functional vs. dysfunctional.

Portfolio effects may be discernible within institutions as well as across institutions. It is common to observe how R&D institutions become shaped by the patterns of funding that become available to them. If a single agency provides a particularly large share of an organization's total funding, agency actions can have the effect of molding or changing the very character of such organizations (as, for instance, the manner in which OE reoriented the labs into development organizations through funding messages sent out around 1968).

In summary, then, interaction effects need to be considered in terms of their synergistic effects, their congruency or incongruency with each other, their lagged (and indirect second- and third-order) effects, and the cumulative ("portfolio") effects within and across institutions and personnel.

The essential point is that multi-purpose effects are inevitable. The issue is not whether there should be multi-purposes but rather whether they are to be recognized or ignored, and if recognized, whether they are to be capitalized upon and treated in a manner that minimizes the possibility of anti-purpose effects.

e. Agency Conception of Broad or Narrow Mission

The key question a lead agency such as NIE has to address is whether its mission is to be construed narrowly or broadly, for this mission perspective will determine how the Institute allocates the limited funds under its control. If it conceives its mission narrowly, it will operate like all other funding agencies, making individual funding decisions on an individual, ad hoc basis, considering only the merits of a particular proposal and only the requirements for producing a particular output. If, however, the lead agency mission is conceived more broadly, then the agency accepts the responsibility to use its funds to facilitate the development and strengthening of the educational R/D&I system, including system capacity-building, system maintenance and system monitoring. It means, too, that the agency is accepting the responsibility to play an active role in shaping the system.

A mature R&D system orchestrates itself. Relationships are well developed. Participants know what to seek and to deliver, from and to where, and what to expect and trust. An immature system needs help to grow, and to learn how to achieve such a self-organizing state. If education is to be served by a quality R&D system, two major requirements will need to be satisfied. These involve: (a) system building, maintenance, and protection; and (b) system orchestration.

If NIE is to carry out these roles, it needs to base its decisions on an understanding of the system's capacities, as they are now, as they might become, and as they vary across different functions and sectors that make up the educational R/D&I system.

f. Parameters and Guidelines for Budgetary Planning

The bulk of the CISST analysis focuses on selected educational R/D&I functions (research development, dissemination, and evaluation); the generic requirements for quality work in each of these functional areas regardless of the particular context or field in which the work is carried out; the extent to which these conditions do or do not characterize these functions as they are carried out in educational R/D&I; and the implications of this for the roles NIE might play and the manner in which NIE might relate to the field so as to carry out its congressionally mandated mission to build an effective R&D system.

That analysis is far too lengthy for us to try to summarize here. However, some useful parameters and guidelines for budgetary planning are suggested by the analysis. The key question to be answered is: given the immaturity of the educational R/D&I system and the consequent need for system building, how can NIE best allocate its financial resources? Among the factors that need to be considered to answer this question are the following:

First, there are inherent differences in funding requirements for different functions. For example, both institution building and project costs in basic research tend to be significantly lower than those required for applied research, and both kinds of research tend to require far smaller outlays than would be called for by development activities. Consequently, the effect of increasing the allocation for a particular function by x dollars will vary from function to function. While that sum might have a major effect in strengthening the functioning of basic research, it might have only a marginal or near-zero effect if added to the funding of development activities. Similarly, the somewhat larger sum of y dollars might be greater than could be productively absorbed immediately by the basic research community in education-relevant areas, but might have a decided and almost immediate effect on strengthening dissemination activities.

Second, the time required to build a system will vary across functions. For example, the time required to train quality basic researchers is substantially greater than the time required to train development specialists. The skills required to carry out quality work in basic research take longer to build and the disruption caused by funding setbacks tends to have much longer consequences. In short, the two functions vary greatly in the time horizon needs of funding and the impact of funding changes.

Third, the system building process should be carried out with a view toward balance in the total system among functions, personnel, institutions, sypply and demand.

Fourth, NIE is neither the only nor the largest source of funding for educational R/D&I. Thus, on the one hand, NIE could attempt to increase its leverage through coordination and orchestration with other agencies to achieve multiplier and synergistic effects. On the other hand, NIE budget allocations might focus on gap filling in areas not funded by other agencies. Thus, it is possible for the NIE budget to reflect cross-agency opportunities as well as NIE priorities and levels of effort.

Fifth, consideration must be given to the minimal (floor) level of funding needed to maintain quality and stability within a function, and to maximum (ceiling) level of funding that can be absorbed productively by a function given its current state of development. For instance, research system building rates and the ability to spend funds productively are limited by the number and scale of the existing centers of excellence. To consider another example, funding for system building must be concentrated rather than scattered around.

Sixth, there must be funding stability over time. System building is a sustained rather than an "in and out" kind of process. A three to five year period would be minimal for any kind of system building impact, and would be completely inadequate for the research function where the required time horizon is much longer. For total system building, an even longer time frame is required.

Finally, from the political point of view it may be vital to attempt to educate the relevant communities as to the immature state of development of the educational R/D&I system and to the fact that the next few years need to be seen as a period of long term capital investment if we are not to be burdened in the future with the errors of the past as we see them today.

g. Appropriate Procurement Strategies

System building must be understood as different from procurement of a product, requiring somewhat different approaches to solicitation. For the procurement of a product, open competitive bidding in response to an RFT may be a valid solicitation strategy. However, system building is likely to require a more active stance by the agency and a tighter degree of selectivity and control by the agency than would be possible under standard RFP and competitive bidding procedures. Thus, there is a dilemma in that the sole source approach is most appropriate for system building purposes, but there are severe legal and political constraints on its use. It may be necessary to educate Congress and other relevant groups as to the long-term requirements for system building and the, differences between the requirements for system building, on the one hand, and the procuring of products and services, on the other.

As advocated by the Campbell panel, it would seem essential for NIE to have a clear sense of who can best do NIE's work, to procure from these institutions without incurring the wasteful costs of mass open competitions, and to develop a close working relationship with the strong talent in the field so as to develop and improve their proposals and their work in progress. Such patterns of functioning are not encouraged by current perspectives in federal funding. In fact, such approaches are viewed as unethical, leaving the offending agency staff member open to censure (or worse). Clearly, the approach recommended here requires a radical restructuring of the mores that surround federal procurement of educational R/D&T activities.

h. <u>Agency-Field Relationships in Procurement and Non-Procurement Activities</u>

One of the starting points of the Agency-Field analysis was a rejection of the agency vs. field dichotomy. The perspective that sees the agency as one group and the field as another seems to us to be fundamentally in error. If NIE is to work effectively to facilitate the building of system capacity and to improve the system's environment, the agency must view itself (and be viewed) as an integral part of the field.

For that perspective to develop, agency personnel must have close working relationships with the field and function in a basically collaborative mode -- in agenda building and refining; in program development; in planning specific procurements and in selecting those who will be awarded the grants and contracts to carry out the work; in promoting collaboration, consultation, and information flow among groups in the field; in reviewing and strengthening work that is proposed and work in progress; etc.

What this means for the exercise of the lead agency role is that a considerable amount of staff energy and a portion of NIE's resources must be allocated to non-procurement activities -- holding conferences; attending meetings of professional associations and possibly making presentations, holding symposia, leading discussion groups, and meeting informally with researchers from the field; meeting with diverse researchers, R&D personnel, practitioners, and various interest groups across the country; drafting (or commissioning the drafting of) issues paper for distribution to members of these various networks for their reactions and comments; working with other federal agencies and other non-federal sponsors of educational R/D&I activities as well providing a degree of coordination and orchestration to the whole educational R/D&I enterprise; etc. This would seem to be necessary both because NIE is the lead agency for educational R&D and because more funding of educational R/D&I is provided outside NIE than by NIE. This may mean that a significant portion of NIE's efforts may need to be applied toward a specific critical area even though relatively little of NIE's budget is applied to this same area. Stated another way, NIE's focus of concern would shift to needs and not be restricted to the implications of its budget per se.

Clearly, if the agency is to act effectively in a collaborative relationship with the field, the character and quality of NIE's own staffing will have a critical impact on the direction and effectiveness of the Institute. For example, the NIE role of orchestration requires personnel who have skills in orchestration and in facilitating collaboration between people and/or between institutions and agencies. In addition, NIE will need some personnel who have "political savvy." And, if the research function is to be built collaboratively with the field, and if NIE staff are to be able to orchestrate the diverse elements in the research community, NIE will require an internal research capability with a staff of talented researchers who can win the respect and esteem of the research community. If this approach to agency functioning is to be put into effect, staff members will have to see themselves in a much more active stance in relation to the field, and be comfortable with engaging the field in an ongoing basis on virtually all matters of the work they carry out. This, too, requires something of a restructuring (as well, no doubt, of at least a partial restaffing) of the agency.

i. Appropriate Funding Formulas and "Rules of Thumb"

In requesting that work be carried out on the FIS issue, it appears clear that the NCER was hoping to arrive at (among other things perhaps) a formula for determining what percentage of NIE funds to set aside for the funding of field-initiated work. However, our argument has been basically that no simple formulas are appropriate, and that the issue is far more complex than had previously been supposed.

Rules of thumb have been in wide use among funding agencies. For instance, one rule of thumb we have heard has been "only offer a grants competition when a total of one million dollars can be provided and when you can fund 25% of the proposal submitted." There is an inherent logic in such a rule of thumb -- i.e., it is correct that the expectations of the field should not be raised beyond reasonable levels of potential for fulfillment.

However, rules of thumb tend too often to fall into the trap of ignoring critical system or function dynamics, conditions, needs and requirements. In the above case, the danger would be that such a grants competition would be used in an area so lacking in excellence that the funding of 25% of proposals at the one million dollar total level would tend to trap the agency into providing much of the funding to low quality, low-success-probability projects.

The crux of the argument has been that this supposedly simple question is in fact embedded within other system issues of a fundamental nature and NIE's response to the issue is bound to have system-wide impact. Rather than providing a simple formula for determining what percentage of funds should be set aside by NIE to fund field-initiated work, the CISST analysis called for a radical restructuring of the agency's relationships with the field and more complex (rather than more simplified) approaches to planning budget allocations. The consequences of this approach to answering the requested question would soon become apparent.

E. NIE Response: Initial Enthusiasm, Then Shelving of the Analysis

When the Agency-Field analysis was submitted to NIE, it was greeted initially with what appeared to be a highly enthusiastic response, from the R&D System Support Division, the NIE Planning Unit, and the NIE Director's Office. The report was widely disseminated across the Institute. It was even suggested that a series of conferences were being planned to permit us to meet with individual staff units within NIE's organizational structure and to discuss the implcations of the analysis for the planning of their procurements and the conduct of their other non-procurement activities.

However, after continued delays while the staff was overwhelmed by other, pressing matters, the whole project was shelved and the report was buried. We had met briefly with the Director, and held a lengthier full-day session with some staff from the R&D System Support Division. Also, a contract continuation was negotiated to include our development of a budget planning guide that would translate our recommendations into easily understandable procedures that could be used especially by NIE's planning unit. But even this contractural item was later modified to permit us to substitute another piece of work for the budget planning document.

The reason in large part was that within a few short months there was no longer a client interested in the development and use of such a document. The key planning staff members who had been interested in the development of this document left to work elsewhere, and the new and remaining staff had other interests. Other top-level NIE management changes were also in the making. And the one, unchanging constant in the picture, the R&D System Support Division, remained as isolated as ever from the rest of the Institute. It therefore was not in a position to exercise the kind of leadership role required to reorient an agency's thinking and behavior in the manner recommended in the Agency-Field analysis.

Our conversations with staff members from other units of NIE suggested that most had never heard of the report or its recommendations, much less read it. Clearly, the report was wordy and ponderous, and a more concise, more forcefully presented analysis might have been more effective. But the Campbell Report a year earlier had been concise and well written and, though more widely read and discussed, had a similar fate. What does all this suggest about the context of educational R/D&T policymaking at NIE?

F. Agency-Field Relationships and the Context of Educational R/D&I Policymaking

As in the case of the Campbell Report, the fate of the *Agency-Field Relationships* analysis suggests: (a) the same "stop-and-start-anew" effect on policy development of staff and management changes; and (b) the same tendency to commission analyses and reports and then ignore the recommendations and bury the reports, especially when the recommendations are not congruent with previously-held orientations toward the policy decisions to be made.

But perhaps even more critical, the report may have been ignored because it was not adequately responsive to the concerns that led to its being commissioned. The NCER wanted a simple pat formula to determine what percentage of NIE's budget should be set aside for field-initiated fundamental research. Instead, this analysis said that the problem was much more complex than that, and would require more thinking and analysis, and that even that additional thinking and analysis was not likely to produce a pat formula since we did not currently have good data on the elements that would comprise the more complex approach to answering the question (e.g., the level of funding the fundamental research community could productively use now and the rate at which this level could be expanded while still maintaining excellence in the quality of the research output). The lesson to be learned, then, would seem to be: give the policymaker a "handle" for meeting his need, how, even if you must tell him that his problem is more complex than he had previously thought, and even if that "handle" is no more precise than a rough "guestimate."

Perhaps the strongest evidence in support of this bit of conjecture is to be found in the history of the last funding policy issue we consider in this chapter, the issue of allocating funds to the support of field-initiated fundamental research relevant to education. We turn to this issue now.

4. Strengthening Fundamental Research

A. The Issues

- What policies are most appropriate for strengthening the conduct of fundamental research relevant to education?

- Should a percentage of NIE's budget be set aside for support of fundamental research, and, if so, what percentage?

- What degrees of emphasis should be given to field-initiated (as opposed to NIE-directed) work and to work carried out by individual researchers and small groups of investigators (as opposed to larger research teams)?

- What roles should be played by the research community in the planning and conduct of NIE's research program?

- What other roles should be played by NIE, and what other actions can NIE take to strengthen fundamental research relevant to education?

B. Historical Background

In June, 1976, shortly before the CISST FIS analysis was requested, NIE and the NCER commissioned the National Academy of Sciences to prepare an analysis and series of recommendations on the funding of fundamental research relevant to education. As discussed above, the basic research community had been increasingly critical of both the level of basic research funding provided by NIE and the extent to which NIE was prepared to fund field-initiated work. The request was made to the NAS in an effort to be responsive to these concerns.

The National Academy of Sciences, in cooperation with the National Academy of Education, established a Committee on Fundamental Research Relevant to Education, headed by Sheldon White of Harvard University.

The Committee had been asked to address three matters relevant to NIE's congressionally mandated mission to improve education by strengthening its scientific foundations. They were asked to: (a) identify promising lines of fundamental research that were contributing to the improvement of education and in particular to note those lines of research that appeared "particularly promising and deserving of higher priority than they are now given";[119] (b) assess the adequacy of federal support for fundamental research relevant to education; and (c) recommend changes in policy, if any, that should be considered.

The following year, the Committee submitted its report, Fundamental Research and the Process of Education.[120]

C. The NAS Report

The NAS report is a highly useful brief on behalf of the value and importance of fundamental research.

a. The Relevance of Fundamental Research

The report defines fundamental research as "undisciplined inquiry whose purpose is to understand why and how education takes place." Disciplines identified as relevant to education include the behavioral and social sciences (e.g., psychology, sociology, anthropology, political science, and economics) and some of the humanities (e.g., philosophy and history).[121]

Though not requested to do so, the Committee allocated a sizeable portion of their effort and of the report to arguing the "relevance" of fundamental research to the improvement of education and to showing by way of example just how fundamental research has contributed and can contribute to education. The Committee was responding here to the skepticism expressed in official Washington at that time as to the value of the federal government's continued support for fundamental research, especially in the field of education. As they expressed it themselves in the report, "Our reading of government documents and reports on education, the testimony of government officials before Congress, and our discussions with congressional staff and program officials greatly increased our concern with these questions."[122] Consequently, they reformulated the first question asked of them (i.e., identifying promising lines of inquiry in need of priority attention) into a somewhat different set of questions: How does education improve? How does fundamental research contribute to the improvement process? What makes it highly "relevant"? The latter question was, no doubt, a response to the oft-heard criticism that fundamental research is rarely "relevant" to the pressing problems faced by educators.

The Committee's answer to these questions took the following form:

> ... what makes fundamental research relevant is the improved knowledge it generates, which in turn is a condition for more useful views of how education takes place, new visions of what is educationally possible, stronger commitments by those who educate, and improvements in instruction and educational institutions....[123]

> ... fundamental research has had its major and most useful impact on education through the gradual, public diffusion of new ideas and concepts that have been assimilated into the expectations, practices, and resources of education. These have influenced practitioners' views of reality, their vision of the achievable, their know-how, and their commitment to act....[124]

This "diffusion of ideas" notion was tied to the remainder of the Committee's argument, the need for quality work and the requirements for such quality work -- i.e., higher levels of funding, administered in a way that allows greater autonomy for the field:

> We believe that fundamental research relevant to education is basically a development of ideas for explaining how and why education occurs across places, time, and groups of people. The quality

> of this development is reflected in the validity of the new concepts and understanding that gradually diffuse to educators and the public, where it stands its ultimate test: the degree to which educators, students, and citizens find the new ideas more useful, more sensible, than the old ways of thinking. In turn, the quality of fundamental research depends heavily on the standards of those engaged in it and on their resources for systematic observation and careful analysis, building upon the work of others, responding to emerging possibilities, and examining the many realms in which basic educational processes occur. These resources depend on two factors insufficiently represented in the practice of federal policy today -- commitments to financial support and flexible management that encourages self-directed fundamental inquiry.[125]

The Committee then devoted a full chapter to illustrating the contributions to education made by eight selected areas of fundamental research. In a detailed appendix, the same point was made by means of a study of citation patterns among basic research journals, educational research journals, and education magazines written for practitioners. The data showed that basic research literature from the behavioral and social sciences "has considerable impact on the writings of educational researchers and practitioners."[126]

b. Assessment of Federal Support of Fundamental Research Relevant to Education

The most important single section of the Committee's report is their critique of federal policy (especially NIE policy) on the support of fundamental research relevant to education. Though they acknowledged that the kind of data needed for their analysis were (at the time the report was prepared) "sometimes unreliable or unavailable",[127] they proceeded to base their analysis on the data available to them at the time.

The key points they make in their critique are the following:

i. Total Educational R&D Support Level

Across agencies and programs, federal support for educational R&D is sizeable: "The total support for education R&D is quite large -- 33 percent of all social R&D, and 3.6 percent of all federal services to education -- or just over $.5 billion."[129]

ii. Research Support as a Percentage of the Total R&D Budget

Federal agencies that sponsor R&D relevant to education differ in the percentage of their R&D budgets they allocate to research. In some, such as the Department of Defense or the Department of Commerce, as much as one-third of their R&D budgets go to research. Their estimates for OE and NIE, however, are that less than 10% of the funds go to research while more than 50% goes to demonstrations and around 25% to dissemination.

iii. Basic Research Support as a Percentage of Total Research Support

When the data are considered together for all federal agencies that sponsor R&D relevant to education, approximately one-third of the total of research support goes to basic research. The percentage is even smaller (22-29%) when attention is restricted to the agencies directly concerned with research in education, and smallest still (15-20%) when one examines the data for OE and NIE alone.

iv. <u>Basic Research Support as a Percentage of Total Education R&D Budget</u>

The data for all federal agencies engaged in social research show that 11-12% of total federal R&D funding is allocated to basic research. However, when the data are examined for only those agencies concerned with education, only 3-4% of R&D funding is allocated to basic research. When attention is restricted to OE and NIE alone, that figure is further reduced to 2%. The conclusion of the Committee is that fundamental research relevant to education is a low priority item in federal agencies who are responsible for supporting or improving education, and lowest of all in OE and NIE.

v. <u>Fundamental Research Support Under NIE Compared to Fundamental Research Support Prior to 1972</u>

Worst of all, from the perspective of the research community, research was receiving less support from NIE, both in absolute and relative terms, than it was receiving prior to the establishment of NIE which was explicitly mandated to strengthen the scientific and technological foundations of education. In 1968, research was receiving approximately one-third of total federal R&D funding, basic research represented approximately 13% of the research budget across federal agencies, and OE allocated approximately 7% of its R&D budget to basic research. In 1975, research was still receiving more than one-third of R&D funding across federal agencies, but in OE and NIE together, research was receiving around 10% of R&D funds and basic research was receiving 2% or less. Not only the percentages but even the dollar amounts available for basic research in education declined between 1968 and 1975. While federal support for educational R&D activities in general has increased in recent years, fundamental research support has not shared in this growth and has even suffered a decline in available dollars.

vi. Uneven Quality of Work Supported

Some of the R&D activity that has been supported has been of high quality, Sesame Street being an outstanding example. However, much other work has been poor in quality, largely because it has not been adequately informed by the existing knowledge base from fundamental research, and because quick solutions have been sought in areas where existing knowledge was inadequate as a basis for such solutions.

In our judgment they represent an ill-advised trade-off of scientific quality and future

> understanding for promises of immediate products and superficial benefits.[130]
>
> Unfortunately, many of the new R&D programs for education have not built on what is known, have contributed little to what is known, and have unknown or little usefulness for the practice of education. Demonstrations and development projects, for example, have been conducted with inadequate or no planning for their assessment, and attempts to evaluate them retrospectively have proved to be of limited value. Overevaluation--or more precisely, unfocused, poor quality evaluation--is another problem. Even more serious are those projects that contradict what is known scientifically, build on an inadequate base of knowledge, are ill designed to fill gaps in understanding, or require quick, predictable answers from science that are inherently impossible to achieve.[131]
>
> On the whole... we believe that the federal government has adopted policies that encourage superficial and wasteful research that has the appearance of relevance but lacks the substance of general principles. We recommend a significant redistribution of emphasis toward more fundamental research in education and toward a more measured approach to education R&D of all kinds.[132]

Clearly, what was called for, according to the Committee, was a higher level of support for fundamental research, to increase the likelihood of producing sound solutions in the future. The Committee did not view this as dependent on a higher NIE budget. Rather, they argued that there should be a redistribution of emphasis within the current level of resources, which seemed to the panel to be "clearly sufficient."[133]

vii. Procurement Mechanisms

Of all the procurement strategies that might be used to solicit research, the Committee came out strongly in favor of unsolicited proposals as "the most productive tool yet devised for managing research without destroying freedom of inquiry."[134] Grants competitions were also treated favorably. The argument for these mechanisms was based on the Committee's analysis of the characteristics of a productive research environment and the attendant conditions the federal government needed to create in order to facilitate the development of this kind of environment. The requirements noted included: a setting in which expert criticism flourishes (as would be the case under peer review of proposals); time; and openness and flexibility, needed especially for exploratory research.

viii. Lack of Active Lead Agency Role

NIE was criticized by the Committee as not adequately fulfilling its responsibilities as the lead agency for fundamental research relevant to education.

> Unfortunately, service has gradually pushed out research, and applied work has driven out fundamental work. During Fiscal 1976:
>
> - Less than one-third of the NIE budget was allocated to research.
>
> - Approximately 11 percent of the NIE budget (or $10 million, including the 1976 transition quarter) was claimed by NIE to be allocated to basic research.

- According to our estimates, fundamental research obligations actually incurred during the period totaled a little more than $5 million, or 5.7% of the budget....

- Research investigators in universities, labs and centers, and elsewhere had no clear idea of the overall intentions for research .... Programs for research were abruptly terminated; some were announced but not funded; and deadlines for proposals were set, in some instances, two weeks or less after the program announcements were received by researchers.

- The staff of NIE had diverse and contradictory perceptions of its policy for research, especially fundamental research, but nearly all agreed that fundamental research was of lowest priority and was the first item subject to budgetary cuts.[135]

The Committee called on NIE to adopt and implement "a clear strong policy" on funding research and to exercise a strong leadership role for federal sponsorship of research.

> The National Institute of Education ... can and should differentiate its role from those of other agencies.... NIE's programs should establish a position of leadership in research relevant to education.... It can concentrate on problems that require more basic understanding and involve the interests of more than one agency. The Institute can take the lead in anticipating issues and in stimulating pioneering research in education. Promoting better coordination of the government's research efforts in education is another task that NIE should undertake. There is currently some interagency communication, but NIE's role should be more active. The lack of coordination is more a problem of wide gaps and lack of leadership than of undue overlap or an absence of communication.[136]

ix. Call for Advisory Groups

As the Campbell Panel had similarly done before it, the Committee recommended that NIE establish one or more special advisory groups "for obtaining the advice of the scientific research community on its overall research directions and quality....Distinguished basic scientists and scholars working with citizens and educators would help to formulate the research directions, appraise the general quality of work, and identify important educational problems amenable to scientific inquiry."[137]

c. Recommendations

The Committee's recommendations were few and were relatively straightforward. They fell into four areas. They called on NIE to:

- reemphasize fundamental research (to be operationalized by allocating a higher proportion of the federal education R&D budget to fundamental research);

- improve the scientific quality of funded R&D by providing for a more active role by researchers in planning and reviewing R&D programs to make certain those that are undertaken are based on a strong knowledge and not undertaken simply because of the significance or urgency of the problem area);

- make more extensive use of field-initiated proposals and peer-review systems to fund research, and establish separate budgets and review panels for field-initiated work; and

- assume a more active leadership role in the federal research effort, by adopting and implementing a clear policy in support of fundamental research, taking a more active role in attracting first rate talent to educational research, supporting long-term work on important problems, encouraging pioneering research, and adopting personnel policies that would give the Institute a capability to adequately understand and interact with the researchers in the field.

D. The NCER Programs Committee Report and Draft Resolution on Fundamental Research

A short time after the NAS submitted its report on fundamental research, the NCER Program Committee prepared a brief report of its own (summarizing the NAS report) and a draft resolution on the sponsorship of fundamental research.[138] They noted particularly that the NAS had concluded that: (a) fundamental research was a low priority item for agencies responsible for managing educational R&D; and that (b) NIE had not adequately fulfilled its mandate to strengthen the scientific and technological foundations of education. The NCER Program Committee accepted the argument that "If the knowledge upon which applied research and development projects are based is inadequate, the likelihood of their producing valid or beneficial results is doubtful." While there is already, as described by the Program Committee, "a considerable body of fundamental research" that exists to serve as a base for many kinds of R&D projects, their statement indicated that this knowledge base needed to be extended. They therefore called for a substantial increase in NIE support of fundamental research relevant to education, so that NIE could "fulfill its potential for aiding major long term improvement in education."

The draft resolution: (a) specified set-aside percentages and target dates for allocations of NIE's budget to support of fundamental research; (b) called for maximum involvement of the research community in planning research agendas and making decisions about research to be supported (through unsolicited proposals, participation in development of guidelines, roles in review panels for specific proposals and for review of NIE's overall fundamental research program, working with research associations and organizations, etc.); (c) called on the NIE Director to work with other federal agencies through the Federal Council on Educational Research and Development to coordinate the support of fundamental research; (d) mandated that the NIE staff include a "substantial number and proportion" of competent researchers with recent research experience, placed in "positions of responsibility in all activities of the Program Groups affecting fundamental research decisions"; and (e) specified reporting requirements to insure adequate implementation of the resolution and its annual review by the NCER.

Of greatest consequence was the section of the resolution dealing with the allocation of funds:

a) At least 20% of the Institute's funds shall be used to support fundamental research relevant to education by FY 1979, and by FY 1985 this shall have increased to at least 30%.

b) At least half of the minimum thus allocated (10% of the Institute's funds in FY 1979, increasing to 15% by FY 1985) shall be used for research grants to individual investigators or small groups of investigators.

A footnote to the draft resolution indicated that some of the members of the NCER Program Committee agreed with the intent of this section of the resolution but preferred wording that did not specify set-aside percentages or target dates. The wording preferred by this group was the following:

a) A significantly greater portion of the Institute's budget shall be used for fundamental research in FY 1979 than in 1978 and each year thereafter until a level is reached that is satisfactory to both the Director and the Council.

b) At least half of the funds thus allocated shall be used for research grants to individual investigators or small groups of investigators.

E. The CISST Analysis: Strengthening Fundamental Research

The CISST poli[illegible]s team had been working closely with several units o[illegible] at the time the NAS Committee submitted its draft and final reports and the NCER Program Committee issued its draft resolution. We had been given copies of all of these documents and asked informally for our reactions. After providing some of these reactions and discussing them with several staff, CISST was asked to prepare a formal critique of the issue and the relevant documents. This was included in our contract modification, substituting this critique (for which there supposedly was an interested audience) for the budget planning document we had earlier been asked to prepare as a followup on the Agency-Field analysis (before NIE lost those staff members in the NIE planning unit who had constituted the interested audience for that analysis).

We summarize below the key points in the CISST critique.[139]

a. A Balanced Perspective Needed on Support for Fundamental Research and Other R/D&I Functions

NIE has lead responsibilities for all aspects of educational R&D, not just for fundamental research. While the NAS Committee was charged to examine only fundamental research, NCER/NIE deliberations should not consider fundamental research apart from its other areas of responsibilities. NCER/NIE have the responsibility to balance policies and strategies across all aspects of educational R&D, a balance not present in the NAS and NCER documents and potentially threatened by the NCER recommendations.

While it is valid to consider the need for strengthening fundamental research relevant to education, NIE also has responsibility for and must give consideration to need identification, applied research, development, and dissemination. In light of its responsibility for educational problems and practice, NIE must also give consideration to such matters as policy research, training, and technical assistance for users of educational

R&D outputs. In addition to consideration of each of these areas individually, NIE must also give consideration to orchestration and system building across these areas. Simply put, NIE must consider educational R&D as a total process of innovation.

This requires that NIE give consideration to: the need to balance NIE's responsibilities across each of these areas; the need for a balanced rate and level of development across each of these areas; and NIE's responsibility for the impact of educational R&D on the educational operating system. Here, then, several basic questions must be asked which are not asked in either the NAS or NCER Program Committee reports.

- What are the needs in all of these areas for which NIE has responsibility?

- What are the relative levels of funding required for significant impact across the various educational R&D related areas?

- What impact would various levels of funding for fundamental research have on NIE's ability to fulfill its responsibilities in other educational R&D areas?

The NAS and NCER have concluded that education-relevant fundamental research should be strengthened. However, because educational R&D is relatively young in this country, all educational R&D areas need strengthening, though in varying degrees. In particular, some people consider need identification, applied research, dissemination, and implementation/utilization support to be areas which have even more "need" for "strengthening" in the field of education than does fundamental research.

b. The Context of Fundamental Research Relevant to Education

There are at least several critical considerations upon which funding decisions for education-relevant fundamental research should be based.

First, excellence is critical to fundamental research in any field. Funding levels greater than what can be used effectively by high quality researchers and research institutions simply invite application by and distribution of funds to low quality researchers and research institutions. Thus, funding must be provided in a manner which carefully selects high quality programs or projects and screens out low quality ones.

Second, if excellence is a critical requirement, then the capability of the field to absorb and use productively increased levels of funding for fundamental research is limited by the available base (i.e., the availability of high quality fundamental researchers and fundamental research institutions). Simply put, the fewer the number of available high quality fundamental research personnel, the lower will be the level of funding for fundamental research projects which can be productive.

Third, the current base of fundamental researchers and research institutions also limits the rate at which the fundamental research community can be built up, for it is the existing personnel and institutions which provide training for new fundamental research personnel. Further, training of new, high quality fundamental researchers does take time. These considerations are constraints on the ability to improve or strengthen fundamental research through increased levels of funding, and these are not issues considered in the NAS or NCER reports.

The existing base of high quality basic researchers within education is small, and this operates as a constraint on the rate at which the field can be built up. The numbers of quality fundamental researchers and research institutions in areas relevant to education is more substantial, but the low prestige of educational research tends to act as a constraint on attracting large numbers of these researchers to education.

c. The Inherent Funding Requirements of Different Kinds of R/D&I Activity

Different kinds of R/D&I activity have different inherent cost requirements. Compared to applied research and development, the costs of fundamental research are relatively small. Both applied research and development have requirements of scale several degrees of magnitude greater than the scale requirements of fundamental research. Differences in sectors and disciplines make precise analogies difficult. In areas such as drugs and chemicals (which involve "hard" sciences and which have very high levels of industry involvement), funding may be as much as ten times greater for applied research (and one hundred times greater for development) than for fundamental research. In the "softer" social sciences, the differences in magnitudes of funding may not be so great -- but they are still significant. In the social sciences, funding for applied research typically is two-to-four times greater than for fundamental research.

The implications of this is that funding for fundamental research can be increased significantly without undermining the funds available (and needed) for other R&D functions. At the same time, there is also an implication that funding levels for fundamental research are not typically 20% to 30% of the total combined funding for fundamental research, applied research and development.

d. Impact of Various Levels of Funding for Fundamental Research on NIE's Ability to Fulfill Its Responsibilities in Other Educational R&D Areas

The NCER Program Committee has recommended that 20% of NIE's budget be allocated to fundamental research by 1979 and 30% by 1985. This recommendation can be properly evaluated only in the context of NIE's responsibilities for all aspects of educational R&D (need identification, fundamental research, applied research and development), as well as for dissemination and implementation/utilization of the outcomes of educational R&D. Allocation of 30% of NIE's budget to fundamental research would leave only 70% of NIE's budget for its other R&D-related

responsibilities. Since applied research and development both tend to require much higher magnitudes of funding than does fundamental research, the effect of the NCER Program Committee's recommendation could be to weaken NIE's capacity to meet funding needs for applied research and development -- as well as funding needs for NIE's other education-related R&D areas of responsibility.

Consideration must also be given to the fact that NIE does have fixed expenses for administration (12-14% of its budget in recent years) and other commitments for which funding is allocated (e.g., contractural commitments, programmatic commitments such as the implied three to five year commitments to SEAs involved in the State Dissemination Capacity Building Program, congressionally mandated commitments such as recent legislation relating to the labs and centers). Fixed expenses and commitments cannot be automatically removed or reduced to reallocate funds to fundamental research (or to any other R&D-related concern). Since fixed expenses and commitments already represent a significant portion of NIE's budget, increasing NIE's fundamental research allocation to 20-30% could be accomplished only by using funds from the "uncommitted" portion of NIE's budget -- thereby significantly reducing the level of the discretionary portion of NIE's budget.

This simple fact raises at least two serious questions about the NCER Program Committee's recommendations. (a) Would the remaining uncommitted portion of NIE's budget be adequate for NIE to fulfill its other R&D-related responsibilities? And (b) Would NIE have the level of flexibility and discretionary use of funds it needs to respond to anticipated or unanticipated changes in the educational R&D context, promising new developments in any area of the total educational R&D process, the need to balance the levels and rates of maturation across all educational R&D functions, etc.?

e. The Critical Need for Stability Over Time in the Support of Fundamental Research

Stability over time is very important for fundamental research. Thus, while we recognize that percentages can be useful for administrators, we do question the wisdom of allocating a total budget percentage (10%, 20%, 30% or whatever) for fundamental research. If NIE's budget increased significantly, a total budget percentage basis might well result in more funding being assigned than the personnel/institutional base of fundamental research could usefully absorb. The other side of that coin may be even more worrisome: if NIE's budget decreased significantly, a total budget percentage basis would require cutting funding allocations to fundamental research projects -- thereby introducing an instability which would likely be highly dysfunctional.

f. An Alternative Funding Strategy for Fundamental Research

In light of the above discussion, the need would seem to be to develop a funding policy which is both effective in strengthening fundamental research and feasible given the constraints discussed above and the need for balanced funding across R&D-related areas of NIE responsibility. We suggested in our analysis that there was an effective and feasible alternative strategy which we describe below. This alternative assumes that a certain amount of prior work would be done before the implementation of this strategy, and that in particular this prior work would produce analyses and estimates on such matters as: the levels of funding which the fundamental research personnel/institutional base is currently capable of using productively; the relative need for funding across all aspects of the educational R&D process; etc.

i. Target-Dollar-Amount Level

The alternative strategy we suggested was that NIE establish a target-dollar-amount level for NIE funding of fundamental research relevant to education. The target dollar amount level would likely be greater than the current dollar amount level.

The use of a target-dollar-amount level for increasing NIE funding of fundamental research would serve several purposes and would have several advantages over a percentage-of-budget basis for funding. Both dollar-amount and percentage-of-budget formats would demonstrate the commitment of NIE to a policy of strengthening fundamental research. Both would provide targets or goals to be reached. However, a target-dollar-amount basis for funding would also allow NIE to relate funding to the capability of the field to use funding productively and would protect fundamental research funding from fluctuation or instability in NIE's budget. A percentage-of-budget basis for funding would not serve these purposes. The specific target-dollar-amount level would be established on the basis of realistic estimates of probable NIE budget levels, the capability of the field to productively use funding, and consideration of NIE's mission responsibilities.

ii. Review of Target-Dollar-Amount Level at Five Year Intervals

The target-dollar-amount level would be reviewed at approximately five year intervals. This is essential since it cannot be assumed that any specific level, once set, is either "written in stone for all times" or based on "perfect wisdom." The target level <u>does</u> represent a definite commitment which <u>is</u> based in well-considered judgment. At the same time, there must be review mechanisms which can take into account such context changes as significant changes in NIE's overall budget levels, increased capability of the field to use funding productively, etc.

While a review process is needed, the review must be neither too often nor too seldom. If performed too often (e.g., annually), there is not adequate time to measure and weigh the changes noted above, the danger of instability is reintroduced, and the force of the funding commitment is undermined. On the other hand, if the review is performed too seldom (e.g., every ten years or more), adaptation to context changes may come too late to be effective and the concept of "review" becomes operationally meaningless. Thus, we suggested the review be performed approximately every five years.

iii. Annual-Incremental-Percentage-Growth of NIE's Fundamental Research Budget

In order to reach the target-dollar-amount level specified as policy, NIE would establish as policy an annual-incremental-percentage growth of NIE's fundamental research budget. Any increase in NIE funding for fundamental research must take into account the current capability of the field to use productively increased levels of funding and the rate of development of the field over time. An annual-incremental-percentage basis for increasing fundamental research funding takes both of these factors into account. Indeed, the specific annual percentage set as policy would be based on informed estimates of these two factors.

This strategy is based on the premise that fundamental research by its very nature requires a rather steady growth rate rather than a one-time/short-term spectacular growth spurt. If deemed wise and feasible, the incremental percentage could be higher in the first year in order to bring the level of fundamental research funding up to the level at which the field is currently able to use funding productively. Regardless of what is decided on that issue, the specific annual percentage for incremental growth should also be subject to review approximately every five years (for the same reasons as those considered above for reviewing the target-dollar-amount level at five year intervals).

It should be emphasized that the percentage formula recommended here was a percentage of NIE's fundamental research budget, not of NIE's total budget.

iv. Basing Project/Program Selection on Standards of Excellence Regardless of Totals Available to be Spent on Fundamental Research

It would seem essential that a strategy such as the one recommended here include in it a proviso that funds set aside for fundamental research would be used only when programs or projects meet the criterion of researcher and/or research institution excellence (as well as any other criteria established by NCER/NIE).

v. Flexibility in Growth Rate

Provision would need to be made that for any given fiscal year, the annual percentage growth rate may be temporarily suspended for a one-year period, with the complementary provision that the level of funding already reached would not be reduced.

We have stressed the importance of not providing levels of fundamental research beyond the capability of the field to use productively. An inflexible growth in funding levels does not take this factor into account. The above provision provides the needed flexibility -- i.e., if at any time NIE finds that the level of productive funding has peaked (temporarily), it may suspend the annual increase in the funding level. At the same time, stability would be provided in that the level of funding already established would not be reduced. The intent of a policy of annual increases in funding level would be protected by the provision that a suspension would be for one year only. Continuation of the suspension (if valid) would require an annual decision.

vi. No Target Dates for Reaching the Target-Dollar-Amount Level

We recommended that no target year be established for reaching the target-dollar-amount level. Setting a target year may sound good at first glance, but it is unnecessary and the effect is simply to rigidify the process, thereby leaving NIE less abla to adjust the process to the capability of the field or to changing conditions (e.g., a period in which Congress does not provide for the increases in NIE's budget needed to increase allocations to fundamental research).

vii. Monitoring the Field's Capabilities

As part of the implementation of the above policies, NIE would need to continually monitor the capability of the field to use fundamental research funding productively. This could well be carried out within the framework of the Education KPU Monitoring Program started by NIE's R&D System Support Division. This provision would also serve the secondary purpose of developing and maintaining close contact between NIE and the field and keeping NIE aware of who in the field is best able to carry out needed work.

g. NIE's Roles as Lead Agency

As the lead agency for educational R&D, we agreed, NIE should be carrying out three roles in relation to fundamental research, beyond merely providing funds for fundamental researchers.

One required role is to provide leadership in system-building for fundamental research relevant to education. At the very least, this role implies the need for policies and strategies that: (a) facilitate the development of linkages among disciplines, among funding agencies, and among fundamental researchers; (b) provide for the training of education-oriented fundamental researchers; (c) build and strengthen centers of excellence for education-relevant fundamental research; (d) provide stability; and (e) increase the status of educational research. A system building role also implies that the system-building potential of a specific project should be a major criterion for project selection decisions.

A second, closely-related role is that of orchestration: (a) facilitating communication across disciplines and among fundamental research personnel; (b) working with the field in identifying particular areas of fundamental research which appear to have a particular significance for education; (c) taking a lead role in coordinating fundamental research programs and projects across funding agencies in order to develop synergy across programs and projects; and (d) linking fundamental research to "upstream" and "downstream" R&D functions.

Implied in this orchestration role is yet a third role for NIE -- a coalescing role. Fundamental research relevant to education is highly scattered. It involves a variety of disciplines, each with a variety of research areas potentially relevant to education. Funding for this research is scattered across many funding agencies. Education is generally a secondary concern in these varied disciplines and funding agencies. The education-relevant fundamental research "community" is at best loosely and weakly linked. Education-relevant research is not per se of high status. Thus, there would seem to be a strong need for a coalescing core or nucleus which can: (a) coalesce leadership in the field; (b) scan the various education-relevant disciplines to identify potential for synergy across lines of research; and (c) perform the system building and orchestration roles.

h. The Agency-Field Issue

A basic issue in R&D is the role of the field in relation to the role of a major funding agency such as NIE. Both the NAS and NCER Program Committee reports called for a strong field role in review, in assisting NIE in research needs, and in initiating fundamental research projects. The NCER draft resolution even included a provision that 50% of NIE's fundamental research funds be allocated to "individual investigators or small groups of investigators."

In developing a policy on the way in which the agency should relate to the field, there seemed to us to be some important issues that needed further consideration and clarification.

One of these issues is the level of consensus among researchers in the field about such matters as: identification of key questions in need of answers, adequacy or appropriateness of different methodologies, lines of research which appear to be most promising, etc. Where field consensus is low, it would seem appropriate for a funding agency to work with (but clearly not be directed by) the field to determine areas and projects for funding. That is, the agency would be fairly active in molding and selecting from what the field has to offer rather than just responding to scattered field-initiated proposals. On the other hand, where field consensus on key issues is high, such an agency role would seem less necessary and an approach that was highly responsive to field initiated proposals would seem quite appropriate. Thus, it is incumbent on NIE to determine the level of field consensus on key fundamental research issues before setting a fixed policy about field-initiated proposals. However, pending such a determination, it appears to us that in many areas fundamental research relevant to education is more nearly characterized by low rather than high consensus. If this is indeed the case, the lead roles of orchestration and coalescing become especially important.

A second (and related) issue is the need for system capacity building in relation to fundamental research relevant to education. As we noted earlier, this role implies that projects should be considered in terms of their potential for system capacity building as well as in terms of their quality and substantive output. An overview agency such as NIE is more likely than the field to have an overview perspective of total system building needs and to be specifically concerned with this issue.

The basic implication of the above discussion is simply that there are lead roles which can be performed only by a major funding agency such as NIE and that these lead agency roles are especially important when an R&D system such as that in education is relatively young and immature.

However, having said this, it is now important to balance the discussion by point out, in agreement with NAS and the NCER, that the field must have a strong role in the funding process for fundamental research. Fundamental research is a highly uncertain process. It is difficult to determine which lines of research are "most promising." The knowledge and perspective of researchers are needed if adequate evaluations are to be made of the quality of research proposals.

The practical question at this point might seem to be: How can the "lead" role of NIE and the "strong" role of the field be reconciled. Actually, this is the wrong question. It implies that the agency/field issue is an "either-or" question. We suggested instead that the nature of fundamental research in the educational context requires a highly collaborative agency/field relationship. In order to develop and maintain such a close, collaborative relationship with the field, NIE would need to have fundamental researchers on its staff. And it would seem advisable to have these staff researchers continue their involvement in research and have as a major responsibility maintaining close contacts with other members of the field. The "either-or" question thus gets translated into a matter of determining the most appropriate modes of collaboration. Indeed, if NIE has active researchers as part of its internal staff, NIE becomes, in one sense, a part of the field.

Both the NAS report and the NAS resolution put heavy emphasis on the individual researcher or small research team as the most appropriate or productive mode for fundamental research. Although we do not question the importance of individual researchers and small teams as part of the fundamental research community, we do challenge the perspective that this mode is the only (or even the main) approach to fundamental research or necessarily even the most productive one. Such an implication does not take cognizance of recent trends toward the use of teams in fundamental research in a number of areas. The need for system capacity building suggests the wisdom of a strategy of supporting research carried out in settings that can be characterized as "centers of excellence" and which by their very nature must be institutions where there is a "cluster" of fundamental research personnel who can interact and strengthen each other's work.

There is no evidence for the assertion in the NAS report that the unsolicited proposals mechanism represents "the most productive tool yet designed for managing fundamental research without destroying freedom of inquiry." The discussion of this issue in the NAS report failed to take into account how unsolicited and agency-suggested proposals should be viewed in terms of such matters as NIE's lead agency roles, agency/field relationships, selection decisions regarding lines of research, etc.

In short, this contention fails to consider the matter in as complex a manner as the question requires. It needs to be rethought, along with the proposed policy for funding fundamental research as stated in the NCER draft resolution.

F. NCER Response

The CISST analysis was greeted with some enthusiasm from those within NIE and NCER who had opposed all along the percentage set-aside approach to the support of fundamental research. The CISST team even received a warm and gracious letter from the head of the NAS Committee which had prepared the fundamental research report, acknowledging the validity of some of the points we had made.

However, the final resolution passed by the Council was virtually identical to the draft resolution prepared by the NCER

Program Committee prior to the CISST analysis. The only changes involved additions -- a definition of fundamental research relevant to education, and a call on NIE staff to carry out activities to disseminate research results and support the utilization of research results in the formulation of research plans, educational programs, and educational policies.[140]

The CISST analysis had in no way affected the outcome of the Council's decision making, and, to the best of our knowledge, had little effect on even the deliberations which preceded the passage of the Council resolution.

C. Strengthening Fundamental Research and the Context of Educational R/D&I Policymaking

As in the case of the Agency-Field analysis, a report commissioned by an agency was essentially ignored in the decision making process for which it was supposed to provide some assistance. The fundamental research analysis was considerably briefer and better written than the Agency-Field report, so presumably bulk and ponderousness were not significant factors here. And here, a specific policy alternative was proposed that gave the Council a handle on their immediate policy problem.

But the key reasons for the lack of influence of the analysis were probably much the same as those operative in the case of the Agency-Field analysis. Again (and here even more directly and intensely than in the case of the Agency-Field report), (a) the recommendations of the commissioned report were contrary to the previously-developed policy inclinations and biases of the particular body of decision makers; and (b) the report's recommendations required a more complex approach to the problem than what the Council felt it needed. The Council had a precise formula ready to be implemented immediately. What the CISST analysis provided was a reasonably specific approach to developing a formule but with the numbers needed for policy implementation still blank and essentially unknown. Some prior work would need to be done to develop estimates of how much funding the field could productively use at this time, etc.

Both the Agency-Field analysis and the analysis of funding policies for strengthening fundamental research had been commissioned as a result of the NCER and NIE desire to be responsive to pressures from the fundamental research community for a set-aside for NIE funding of field-initiated fundamental research. Being responsive often requires strong gestures, not calls for additional work to develop more appropriate policies. Now that the gesture has been made, though, the question remains: Will the needed information be gathered and the analyses performed so that more appropriate policies can be developed some time in the future?

V. FUNDING POLICY ISSUES IN NEED OF EXPLORATION

The funding data and analyses which have become available in the last few years have taken us a long way toward understanding what is clearly "the fundamental question in analyzing the allocation of resources. . . Who receives how much from whom for what?"[141]

The better our answers become to that set of questions, the sounder the base for approaching the key questions to be tackled by policymakers: What should the allocation of resources look like? How should funds be distributed across functional areas? across types of institutional performers? across substantive problem areas? etc. And on what bases should such decisions be made?

One useful approach to answering the question of the distribution of funds across functions was taken in a recent article by Ward Mason and Carnot Nelson. Mason and Nelson pointed out that in mission agencies it is common to distinguish between direct and indirect KPU strategies:

- Direct, typically short range, strategies focused on the solution of particular problems.
- Indirect, typically long range, strategies which emphasize the building of resources and capabilities for conducting education KPU. These would include support for fundamental research, building a cadre of highly qualified personnel, and building general purpose dissemination systems.[142]

Each set of strategies requires different kinds of considerations in determining how funding should be balanced across functions. For direct strategies, as described by Mason and Nelson, it would be inappropriate to allocate funds by KPU functions on an a priori basis. Instead, the allocation would be based, first, on the priority problem areas selected by Congress or by the agency, and then on:

> (1) the state of the art for each function within the area, and (2) what the organizational and personnel capabilities of the KPU system are, in regard to each of the functions in that area. For example, if the knowledge base is well developed but there are few curriculum materials which incorporate what is known, then development should be

> emphasized, with due allowance for the role the private sector plays in curriculum development. If, on the other hand, products are available but are untested, then evaluation and demonstration are called for.
>
> Once the area and functions have been specified, it next becomes necessary to examine the availability of performers. If the field is such that there are a number of well-qualified performers (either individuals or organizations), then some form of competitive procurement would appear appropriate. If, on the other hand, there are few capable performers, it may be necessary to cycle back into a long range capacity building effort; this becomes part of the fine tuning of indirect strategies.[143]

In short, for problem solution activities, the allocation is arrived at after considering a host of factors: the problem area to be tackled, how strong the existing knowledge base of each functional area is with regard to tackling the given problem area, how well developed the institutional and personnel base of the field has been developed with regard to meeting that particular need, etc.

Indirect strategies, however, have been treated differently, and here a priori approaches to allocation decisions have often been made -- for instance, the NCER decision to allocate 20% and eventually 30% of NIE's budget to the support of fundamental research. Allocations to resource building (e.g., building capacity in certain kinds of institutions, providing training programs, developing dissemination networks, etc.) are often difficult to justify because they are generally not linked directly to the solution of particular problems, and mission agencies are problem oriented. Therefore, the percentage set-aside (illustrated by the NCER allocation to fundamental research) is often used as the only sure means of channelling funds to resource building requirements.

Those who support this approach tend to see the setting of funding levels "more or less arbitrarily as a percentage of the total effort" as a reasonable strategy, no different from arbitrarily determining the appropriate percentage of total effort than can be allocated to an institution's "overhead."[144] Carrying out fundamental research is a kind of "overhead" or support activity necessary for a healthy R&D system, just as the existence of a strong dissemination network would be, or the provision of training for personnel, or, in the case of a given institution's overhead, the provision of an administrative staff or a typing pool.

Mason and Nelson counter with the suggestion that there must be a better way: "The view which we would propose is that it is possible to increase our ability to make intelligent allocations of funds for indirect strategies."[145] What is needed, is developing a better understanding of "how our institutional and human resources function to generate and utilize new knowledge."[146] In short, what is needed is an understanding of how the system works and the gathering of the kinds of data needed as a basis for sound policy decisions.

All of our own work has been based on the very same premise. We have suggested at several points in this chapter what some of the remaining unanswered questions are. In this concluding section, we bring together some of these points about funding policy issues in need of exploration, and the kinds of data that need to be gathered and analyzed for future policymaking on funding issues.

1. Current Costs

A. Problem Areas

How much has it been costing to do quality educational R/D&I

work, in different functional areas, on different problem areas for which the knowledge base is more or less well developed, and for which the institutional and personnel resources are stronger or weaker?

A few cost figures exist in the literature, for instance, the costs of producing Sesame Street, the NSF Course Content Improvement Program, and the Far West Laboratory's minicourses (all referred to earlier in this chapter). But clearly, there is a wide range of educational R/D&I work that has been funded, some of it has produced quality outputs, and surely there must be a substantial amount of funding data on these projects that might help us develop a better understanding of cost requirements (as well as requirements in other areas such as time, personnel, state of development of the existing knowledge and technology base, etc.).

We need to develop a clearer sense of how much it costs to do quality work of different kinds. Some problem areas are bound to be more costly than others -- because of the state of development of the existing knowledge and technology base, because of the kinds of R/D&I activities called for and their scale, etc. We need to develop a handle on these cost factors. The data are there in funding records. But they have not been analyzed and reported on, and we are therefore lacking this basic kind of information.

B. Functional Areas

Similarly, the same kinds of data should be able to shed some light on the costs that have been incurred across functional areas (the costs of fundamental research vs. applied research vs. development, etc.).

This becomes a bit more difficult to analyze, but might be approached through data on long-term efforts where information exists on the costs incurred by different components on an overall effort. For instance, it might be difficult to put a cost figure on the body of fundamental research on which IPI was based, but there is probably good data on how much was spent on applied research, on development, on field-testing and evaluation, on implementation supports, etc. Similarly, the cost histories of many of the other outputs produced by educational R&D performers over the past decade and a half might be analyzed in similar fashion, to shed some light on the cost factors for different functions. We have some idea of these cost factors from other fields, but no good information on this for the field of education.

C. Institutional Performers

Are certain kinds of institutions more cost-effective for carrying out certain kinds of work? Assuming equal quality were possible in an academic institution and a non-profit research corporation, would it be less expensive to mount a major research program in one rather than the other? It might be assumed that because of existing facilities (libraries, laboratories, concentrations of expertise, etc.) the costs would generally be less in a university. Is this in fact true? To consider another example, it might be assumed that SEAs are probably the best sites for mounting major dissemination efforts, because of in-place linkages to the LEAs who are the ultimate targets of the dissemination strategies. Is this true? Are there ways of determining relative costs for dissemination strategies emanating from different types of institutions? Such attempts would probably break down if the analysis were carried to the point of looking for relative costs "per unit of effectiveness" (however that might be measured in such an amorphous area). But surely there is a great deal of data that might be analyzed to give us some handle on the question of cost variance by types of performer organizations.

2. Generic Factors

A. Cost Differences By Function

We suggested earlier in this chapter that there are inherent cost differences across functional areas. Because of differences in the scale of activities generally required, fundamental research tends to cost considerably less than applied research which costs substantially less than development work, etc. We considered some estimates for the hard and soft sciences on these cost differentials. Is it possible to develop more estimates, from a wider range of fields, and, within education, across a range of problem areas? Even if the estimates developed are far from precise for application to educational R/D&I, the exercise would likely shed a great deal of light on some of the factors that make work in one functional area more costly than work in another. At some future time when funding estimates are needed for an allocation decision, the insight gained from this analysis might be of considerable use. Which of these cost factors might be expected to be operative here, and what might this suggest about the allocation decision to be made?

B. Rates at Which Capacity Can Be Expanded Per Functional Area

We also noted earlier that there are differences among functions in the rate at which their institutional and personnel base for quality work can be expanded. These differences are related in part to the amount of time it takes to train the needed personnel, to establish the needed institutional structures and linkages, to build up a usable knowledge/technology base, etc. Fundamental researchers take considerably longer to train than applied researchers, and all researchers tend to require more training than development specialists, who in turn tend to take longer to train to a high level of competence than dissemination specialists, etc. The length of training required is related to the amount and type of knowledge that needs to be absorbed, the kinds of skills, and probably too the level of skill that defines "competence" and "quality" in each functional area.

Considerably more information is needed to put more precise numbers to these statements. Some insight can be gained from the data on these questions across a range of fields. But, in particular, we need to examine, perhaps in retrospective fashion and through assessments by knowledgeables, how long it has taken quality personnel to develop competence, in different functional areas, given different conditions (e.g.: existence of formal training programs vs. seat-of-the-pants on-the-job learning). We need also to develop estimates of how these rates might be changed by provision of certain conditions that did not exist earlier (e.g.: training programs, professionalization of R&D specialties, improved information flows of various kinds including existence of new specialized journals and targetted communication programs, etc.).

3. Contextual Factors: The State of Development of Different Functional Areas in the Educational R/D&I System Today

How much capacity building activity will be required before certain kinds of work can be carried out in the quantity required to meet needs and with an adequate level of competence?

For what kinds of work, in what problem areas, is there a strong knowledge and technology base that is already able to support quality R&D activity?

What lines of fundamental research show strong promise of having significant implications for education but need considerably more work?

What technologies are best and least well developed for the conduct of educational R/D&I?

In what functional areas and on what substantive problem areas is there already in existence a strong institutional and personnel base? In what areas does the institutional and personnel base need to be strengthened? Which of these represent the highest priority areas?

Given the scale of the existing quality base in each functional area (and perhaps too in each substantive problem area), what is the minimum level of funding required to maintain that existing level of capacity?

What is the level of funding currently being spent "productively" in each functional area and in each priority problem area? (This will, no doubt, require assessments by panels of expert judges asked to distinguish between projects that have and have not spent their funding productively.)

4. Expanding Capacity

How long is it likely to take, and how much is it likely to cost, to expand the base of quality institutions and personnel in each functional area to various specified levels of strength? What alternative strategies, are likely to have what effects, at what costs?

Given the existing quality base in each functional area and in each major priority problem area, and estimates of the rate at which the quality base can be expanded through various alternative strategies, at what rate can the funding level be expanded productively in each area?

Given variations across functional areas in inherent cost requirements, in the amount of capacity building required, in the inherent cost and time requirements of capacity building, and in the rate at which capacity in each can be expanded while still maintaining a high level of quality (given the existing institutional and personnel base in educational R/D&I), what allocation of funding across functional areas would seem to be suggested as needed at present for a helathy educational R/D&I system expanding at a reasonable rate toward greater maturity and higher levels of quality?

5. Funding, Multi-Purpose Procurements and Agency Actions, and Needed Analytical Work

The thrust of the above discussion is heavily oriented toward funding requirements for system capacity building. However, mission agencies must focus on substantive problem solution relevant to agency missions. We have dealt with this problem elsewhere and summarized our analysis in a previous section of this chapter describing the Agency-Field Relationships policy issue. The basic point we tried to make in that analysis was that agency actions (both procurements and other non-procurement actions) should be planned with multi-purposes in mind -- i.e., that while funding a particular program to solve a particular substantive problem, certain kinds of planning and decision making could structure what is done so that capacity building and/or environment-improving objectives are being achieved at the same time and through the same projects as the direct support of problem solution activities.

Ultimately, we would hope that agency planners would be able to make use (either implicitly or explicitly and concretely) of a multi-dimensional grid type of project selection and budget planning instrument that would focus attention on three factors: (a) substantive foci of projects and programs (as these relate to agency missions and priority problem areas); (b) system capacity building/

capacity maintenance requirements; and (c) the existing pattern of funding of the above across all the sponsors of educational R/D&I activity.

Balance across diverse requirements might be assessed in terms of how well a range of different needs were shown to be met by different grid patterns produced by different allocation decisions taken or proposed. Imbalances might be readily pinpointed through such an instrument, as well as allocation shifts needed to bring funding back into greater balance across areas.

What we are suggesting is clearly complex, and clearly will require a considerable amount of data gathering and analytical work before it can be made workable. Nonetheless, much of the data already exists in one form or another, or should exist if NIE's Education KPU Monitoring Program is to function as intended. If it were possible to develop such an instrument, it would take the field a long way toward the "better way" for determining how to allocate funding across functional areas (or institutional performers or other system elements) called for by Mason and Nelson. And clearly, even if such an effort succeeds in only approaching the goal of producing such an instrument, the enterprise should shed a great deal of light on some of the significant unanswered funding policy questions outlined above. And too, the kinds of thinking required and the kind of information gathered would likely provide the field with a great deal of new insight into the workings of the educational R/D&I system and its needs. Without such an approach, much of the system's funding policy is likely to continue to be made on a somewhat arbitrary and ad hoc basis, without adequate consideration of long-term effects on educational R/D&I in this country.

FOOTNOTES

1. For instance, see: Francis S. Chase, The National Program of Educational Laboratories (Washington: Office of Education, 1968); Stephen K. Bailey, "Significance of the Federal Investment in Educational R&D," Journal of Research and Development in Education, Vol. 2, No. 4, Summer 1969; Stephen K. Bailey, "Emergence of the Laboratory Program," Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970; Francis S. Chase, "The Laboratories: 1970 and Beyond," Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970; Committee for Economic Development, Innovation in Education: New Directions for the American School (New York: CED, 1968); Office of Education, Research and Development in the United States (Washington: OE, 1969), pp. 185-186.

2. Roald F. Campbell et al., R&D Funding Policies of the National Institute of Education: Review and Recommendations, Final Report of Consultants to the National Institute of Education and the National Council on Educational Research (the Campbell Report) (Washington: NIE, 1975).

3. Sam D. Sieber, "The Requirements of a National Educational R&D System," Appendix A in Campbell et al., R&D Funding Policies, op. cit.; for a version of this published with the same title, see the Educational Researcher, Vol. 4, No. 11, December 1975. Similar points were also made by Sieber in "Federal Support for Research and Development in Education and Its Effects," National Society for the Study of Education Yearbook, 1974.

4. For instance, see: Committee for Economic Development, Innovation in Education, op. cit.; Roger E. Levien, National Institute of Education: Preliminary Plan for the Proposed Institute (Washington: Rand Corporation, 1970). For a more recent discussion of some of the weaknesses of such comparisons, see Ward S. Mason and Carnot E. Nelson, "A Comparison of Data Bases Describing Federal Funding of Education R&D," Educational Researcher, Vol. 6, No. 11, December 1977.

5. Office of Education, Research and Development in the United States, op. cit., p. 186.

6. National Science Foundation, An Analysis of Federal R&D Funding by Function (Washington: Government Printing Office, 1971 and each subsequent year). For background statistics on R&D, R&D funding, and federal expenditures for R&D (not specific to education), there are several other useful NSF data series

and publications, especially: Federal Funds for Research, Development and Other Scientific Activities and National Patterns of R&D Resources, Funds and Manpower in the United States.

7. Office of Management and Budget, Special Analyses, Budget of the United States Government (Washington: Government Printing Office, published annually); also see other annual OMB publication series such as Budget of the United States for Fiscal Year (particular year): Federal Research and Development Programs or Budget of the United States for Fiscal Year (particular year): President's Budget Request, Justification for Appropriation Estimates.

8. National Academy of Sciences, Study Project on Social Research and Development (Washington: NAS, forthcoming); for a preliminary report on some of the NAS data, see Ward S. Mason and Bruce Craig, "Field Support for Education Research and Related Activities, FY 1975-77: Preliminary Report" (Washington: NIE, November 3, 1976).

9. Stephen P. Heyneman, Toward Interagency Coordination: FY '75 Federal Reserve and Development Activities Pertaining to Adolescence -- Third Annual Report (Washington: Social Research Group, George Washington University, 1975), ERIC CG 010719; Thomas W. Hertz and Ada Jo Mann, Toward Interagency Coordination: FY '75 Federal Research and Development Activities Pertaining to Early Childhood -- Fifth Annual Report (Washington: Social Research Group, George Washington University, 1975), ERIC ED 121467; A. V. Harrell, P. M. Wirtz, and M. Hurt, Jr., Federal Research and Related Activity FY 1975 Project Data Analysis (Washington: Social Research Group, George Washington University, 1977).

10. Carnot E. Nelson, William M. Sowers, and Ward S. Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: A Composite Estimate, By Agency, Using Four Data Bases, R&D System Studies, Technical Report #1 (Washington: National Institute of Education, 1977); Ward S. Mason, Carnot E. Nelson, and William M. Sowers, Federal Funding for Education Knowledge Production and Utilization: KPU Function, By Agency, R&D System Studies, Technical Report #2 (Washington: National Institute of Education, 1977); Carnot E. Nelson and Ward S. Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency, R&D System Studies, Technical Report #3 (Washington: National Institute of Education, 1977); Ward S. Mason and Carnot E. Nelson, "A Comparison of Data Bases Describing Federal Funding of Education R&D," Educational Researcher, Vol. 6, No. 11, December 1977; National Institute of Education, 1976 Databook: The Status of Education Research and Development in the United States (Washington: NIE, 1976), pp. 20-23.

11. For instance, see "Monitoring the Education R&D System: A Progress Report from the R&D System Support Division, DRG, on Resolution 19.1," Internal NIE Memo, July 22, 1976.

12. Office of Education, Research and Development in the United States, op. cit., pp. 113-117.

13. NIE, 1976 Databook, op. cit., pp. 14-33.

14. Karen Shapiro, Matilda Butler, and William Paisley, Monitoring the Status of Educational Research and Development in the United States: Technical Report to Accompany 1975 Databook (Stanford: Institute for Communication Research, Stanford University, 1976).

15. In fact, the policy was to be relevant to 23 institutions created and funded by OE -- 11 regional laboratories, 10 R&D centers, the National Program on Early Childhood Education; and the National Center for Higher Education Management Systems at WICHE. For some of the relevant history, see James Welch, "Toward Autonomy: New Policy for Labs and Centers," Educational Researcher, Vol. 1, No. 5, May 1972.

16. For instance, two internal OE documents: Charles Fry, "Management Policy for Institutional Support and Assessment," (Washington: National Center for Educational Research and Development, Office of Education, February 9, 1972); and Ward S. Mason, "Issues Related to the Transfer of the R&D Center and Educational Laboratory Programs to the National Institute of Education" (Washington: National Center for Educational Research and Development, Office of Education, July 17, 1972).

17. Campbell et al., R&D Funding Policies of the National Institute of Education, op. cit.

18. Michael Radnor, Harriet Spinah, Durward Hofler, and Earl C. Young, Agency/Field Relationships in the Educational R/D&I System: A Policy Analysis for the National Institute of Education (Evanston, Illinois: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1976).

19. For instance, see internal NIE memos produced in August and September of 1976, especially (a) an August 2, 1976 memo written by Susan Duffy and Noel Brennan entitled "Status Report on FIS"; and (b) a somewhat later set of materials providing working definitions of narrow and broad FIS, indicating the relevant dimensions of each, and considering some of the implications for NIE.

20. CISST staff were asked to hold seminars with each division within NIE to discuss the implications of the report with them; only one such seminar was held.

21. National Academy of Sciences, Fundamental Research and the Process of Education, Final Report of the Committee on Fundamental Research Relevant to Education, Assembly of Behavioral and Social Sciences, National

Research Council, Sara B. Kiesler and Charles F. Turner, eds. Washington: NAS, 1977)

22. National Council on Educational Research, "NCER Program Committee Report and Draft Policy Research on Fundamental Research Relevant to Education," (Washington: NCER, July 8, 1977).

23. Michael Radnor, Durward Hoffman, and Harriet Spinah, Strengthening Fundamental Research Relevant to Education (Evanston, Illinois: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

24. This estimate was provided by NIE's R&D System Support Division for a revised version of our draft materials for the NCER report to Congress (see draft of December 14, 1976). Also see: NIE, 1976 Databook, op. cit., p. 16; and Nelson, Somers, and Mason, 1975 Federal Funding for Education [illegible], op. cit.

25. National Science Foundation, National Patterns of R&D Resources, Funds and Manpower in the United States 1953-1973, (Washington: Government Printing Office, 1974).

26. NIE, 1976 Databook, op. cit., p. 8.

27. For instance, see, Committee on Economic Development, Innovation in Education: New Directions for the American School (New York: CED, 1968); Committee for Economic Development, The Schools and the Challenge of Innovation (New York: McGraw-Hill, 1969); Hendrick D. Gideonse, Elements of National Science Policy: A Perspective from the Behavioral and Social Sciences, Paper submitted to the Subcommittee on Science Research and Development, Committee on Science and Astronautics, U. S. House of Representatives, September 11, 1970, Reprinted in The Oregon Studies in Educational Research, Development, Diffusion, and Evaluation, Vol. II: The Literature of Educational RDD&E, Bette C. Porter, ed. (Monmouth, Oregon: Teaching Research, Oregon State System of Higher Education, 1972) Levien, NIE: op. cit., p. 3.

28. Mason and Nelson, "A Comparison of Data Bases Describing Federal Funding of Education R&D," op. cit.

29. Richard Deishimer, The Federal Government and Educational R&D (Lexington, Mass: Lexington Books, 1976), pp. 42-45, 84; OE, Educational Research and Development in the United States, op. cit., pp. 114-116.

30. OE, Educational Research and Development in the United States. op. cit., p. 114, Table 27.

31. Ibid., p. 117.

32. OE, Educational Research and Development in the United States, op. cit. p. 113; Sam D. Sieber, "Federal Support for Research and Development in Education and its Effects," in National Society for the Study of Educa-

tion Yearbook, 1974; Levien, NIE: Preliminary Plan, op. cit.

33. Sam J. Sieber and Paul Lazarsfeld, The Organization of Educational Research in the United States (New York: Bureau of Applied Social Research, Columbia University, 1966).

34. Chase, The National Program of Educational Laboratories, op. cit.; Bailey, "Emergence of the Laboratory Program," op. cit.; Francis S. Chase, "R&D in the Remodeling of Education," in The Oregon Studies Vol. II, op. cit.

35. For instance, see Gideonse, Elements of National Science Policy, op. cit., p. 119; OE, Educational Research and Development in the United States, op. cit., p. 116; and Dershimer, The Federal Government and Educational R&D, op. cit., p. 33.

36. OE, Educational Research and Development in the United States, op. cit., p. 186.

37. Nelson, Somers, and Mason, 1975 Federal Funding for Education KPA, op. cit.

38. See our chapter on educational R/D&I institutions.

39. For some details on this, see our chapter on the dissemination function in educational R/D&I.

40. NIE, 1976 Databook, op. cit., pp. 41-42, Tables 4.3 and 4.4.

41. For instance, see: Chase, The National Program of Educational Laboratories, op. cit.; Chase, "The Laboratories: 1970 and Beyond," op. cit.; Francis S. Chase, "The Educational Laboratories: How Do They Fit into the Future of American Education," in Chase, The National Program of Educational Laboratories, op. cit.; and Francis S. Chase, "Educational Research and Development in the Sixties: The Mixed Report Card," in The Oregon Studies, Vol. II, op. cit.

42. Levien, NIE: Preliminary Plan, op. cit.

43. There were some exceptions to this. The most important of these was the OE status report, OE, Educational Research and Development in the United States, op. cit., pp. 113-117. Another was: Michael W. Kirst, "The Growth of Federal Influence in Education," in the 1974 NSSE Yearbook.

44. See sources cited above in footnotes 6 & 7.

45. OE, Educational Research and Development in the United States, op. cit, pp. 114-116.

46. See Section II-IE in this chapter, "Expectations about Levels of Funding Growth."

47. OE, Educational Research and Development in the United States, op. cit., p. 117.

48. Ibid.

49. This estimate was provided by NIE's R&D System Support Division for a revised version of our draft materials for the NICER report to Congress (see draft of December 14, 1976). Also see: NIE, 1976 Databook, op. cit., p. 16; and Nelson, Somers, and Mason, 1975 Federal Funding for Education KPA, op. cit.

50. In addition to the reasons cited by the OE analysts for believing these figures underrepresented the amounts spent on educational R&D by private foundations, private industry, SEAs, LEAs, and the Department of Defense, the OE analysts indicated the following: "455 of 1,724 abstracts from SIE, DDC, and NSF reported an unknown funding level. The project descriptions themselves indicate that they are smaller than average in size (few of the abstracts for which funding levels were unknown, for example, were development efforts or large scale surveys). Still, if the actual funding levels were to be determined, they could be expected to add a considerable ~~sum~~ to ~~the fiscal~~ year 1968 totals." OE, Educational Research and Development in the United States, op. cit., p. 117.

51. NIE, 1976 Databook, op. cit., p. 16; Nelson, Somers, and Mason, 1975 Federal Funding for Education KPU, op. cit.

52. NIE, 1976 Databook, op. cit., p. 16.

53. This discussion is based on: Nelson, Somers, and Mason, 1975 Federal Funding for Education KPU, op. cit.; and Mason and Nelson, "A Comparison of Data Bases Describing Federal Funding of Education R&D," op. cit.

54. See section I. "Overview of the Available Literature," Part 2, "Data Series on Analyses of Larger, Bodies of Funding Data."

55. Mason and Nelson, "A Comparison of Data Bases Describing Federal Funding of Education R&D," op. cit. Note: The original figure in the Mason and Nelson article also included a prefix table on information provided in the reports of the Federal Interagency Committee on Education. However, since the FICE reports provide no funding data, we have excluded this from our discussion here.

56. In fact, some dissemination and demonstration funding is included in the NSF data base. Since the NSF funding figures are collected from agency self-reports, officials of each agency determine what should or should not be included in the funding totals it provides. NIE, for instance, includes all of its activities in the figures it reports to NSF. See Mason and Nelson, "A Comparison of Data Bases Describing Federal Funding of Educational R&D," op. cit.

57. The above discussion of the NAS data base, its advantages and limitations, is based on Mason, Nelson, and Somers, Federal Funding for Education Knowledge Production and Utilization: KPU Function, by Agency, op. cit.

58. The above discussion of the NAS data base, its advantages and limitations, is based on Nelson and Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency, op. cit.

59. Nelson, Somers, and Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: A Composite Estimate, By Agency, Using Four Data Bases, op. cit.; and Mason and Nelson, "Federal Funding of Educational R&D: R&D Function By Agency," op. cit.

60. This $513 million figure is close to the upper bounds of the earlier estimate made by the NIE R&D System Support Division in the 1976 Databook. The earlier estimate (made prior to the development of this composite estimate) was that $470 million was the most likely figure for federal funding of educational R&D, with a lower bound for that estimate of $430 million and an upper bound of $520 million.

61. The discussion in this section on funding data by function is based on: Mason, Nelson, and Somers, Federal Funding for Education Knowledge Production and Utilization: KPU Function. By Agency, op. cit.; and Mason and Nelson, "Federal Funding of Educatio[illegible]D: R&D Function by Agency," op. cit.

62. NIE's composite data base might have been the best source of information of federal funding of educational R/D&I. However, use of that data base for this purpose would have required coding of information from programs not included in the NAS data base, creation of new data tapes, etc. We assume this was not done because the NIE analysts had severely limited funds to carry out their work, and the additional costs might have been prohibitive.

63. The overwhelming majority of the funding programs the NIE analysts included in their data base were those the NAS team had classified in the education social policy area. Of $452.2 million obligated in FY 1975, $357.8 million (75%) were in the education social policy area; $39.9 million (10%) were in science education; $22.4 million (5%) were in health education; $20.7 million (5%) were in the cultural affairs area; and $21.4 million (5%) were in the employment/manpower area.

64. Mason and Nelson, "Federal Funding of Educational R&D: R&D Functionl by Agency," op. cit., Table 1.

65. The NAS scheme involved dichotimizing all activities as either "Knowledge Production" or "Knowledge Application" and classifying all activities under these broad headings into 7 functions and 24 subfunctions. The NIE analysts used a three-way classification scheme (Knowledge Production, Problem Solving, and Utilization) and classified activities into the 8 functions and 21 sub-functions shown in Fugure 6.3. For explanations of why and how NIE modified the NAS scheme, see the publications prepared by the NIE Analysts. Given the modifications in the data base and classifications made by the NIE team, there are some differences between the findings reported by NIE and NAS.

66. It should be emphasized that, although there is an 88% overlap, the NAS data base used here is not the same as the NIE composite data base we considered earlier in section III.2, "Distribution of Total Educational R/D&I Funding by Sources." In the NIE composite ban, DHEW accounted for 82.4% of total FY 1975 federal funding of education KPU. The Education Division of DHEW alone accounted for 69.9% of the total, and within that division, OE alone accounted for 51.5% of total federal obligations and NIE accounted for 14.4%. In the NAS data base used for the part of the funding analysis reported here, DHEW accounted for only 75% of the total; OE accounted for 54%; NIE accounted for 16%; NSF, 9%; the Public Health Service, 5%; Defense Department, 5%; the National Endowment for the Humanities, 4%; and the Assistant Secretary for Education, 4%. See Mason, Nelson, and Somers, Federal Funding for Education Knowledge Production and Utilization: KPU Function, By Agency, op. cit., Table 2, Column 1 (FY 1975 actual obligations).

67. Mason and Nelson, "Federal Funding of Educational R&D: R&D Function by Agency," op. cit.

68. This figure is likely to have decreased since FY 1975, due to the NCER resolution calling for a deemphasizing of development activities. See National Council on Educational Research, Resolution NCER GP 77-001, March 18, 1977.

69. This figure is likely to have increased since FY 1975, due to the NCER resolution calling for an increase in NIE's funding of fundamental research relevant to education, and a research "set-aside" of 20% of the NIE budget by FY 1979, rising to 30% by FY 1985. See National Council on Educational Research, Resolution NCER GP 77-002, September 16, 1977.

70. The table shows that 36.4% of the funds obligated by the Assistant Secretary for Education were research. This is due primarily to some of the large research programs conducted by the National Center for Education Statistics which has been included under the jurisdiction of the Assistant Secretary (e.g., the National Assessment of Educational Progress).

71. Our discussion of the SRC data base and its limitations is based primarily on Nelson and Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency, op. cit.

72. Ibid., p. 13, Table 2.

73. Ibid., pp. 29, 31, Tables 12 and 13.

74. Ibid., p. 35. As noted there, "This finding contradicts Guba and Clark (197[illegible]) that there is little or no division of labor among different kinds of KPU organizations." The "Guba and Clark" reference is to: Egon G. Guba and David C. Clark, "The Configurational Perspective: A New View of Educational Knowledge Production and Utilization," Educa-

tional Researcher, Vol. 4, No. 4, 1975. We refer to Guba and Clark's "configurational perspective" in several chapters of our analysis.

75. Nelson and Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency, op. cit., p. 56.

76. For instance, See: NIE, Request for Proposals for a Survey of Educational RDD&E Organizations, RFP NIE-R-76-0017 (Washington: NIE, 1976); Joanne Frankel, Albert D. Biderman and Laure M. Sharp, Pretest Report: Registry and Survey of Research Organizations in Education (Washington: Bureau of Social Science Research, Inc., 1977).

77. Frye, Management Policy for Institutional Support and Assessment, op. cit., p. 3.

78. James Welch, "Toward Autonomy: New Policy for Labs and Centers," Educational Researcher, Vol. 1, No. 5, May 1972.

79. Welch, "Toward Autonomy," op. cit., summarizing Frye, Management Policy for Institutional Support and Assessment, op. cit., pp. 4-5.

80. Frye, Management Policy for Institutional Support and Assessment, op. cit., p. 8.

81. Ibid, p. 16.

82. Ibid, p. 19. Note: There are various limitations on what can legitimately be paid for using the independent research funds and the management fee. These limitations are described in the Frye document.

83. Mason, Issues Related to the Transfer of the R&D Center and Educational Laboratory Programs to the National Institute of Education, op. cit.

84. Mason pointed out that the financial problems were particularly serious for the regional laboratories because they were autonomous institutions, less serious for the R&D centers because they were subunits of academic institutions and therefore had the financial resources of the universities at their disposal. Therefore, R&D centers might be able to get advances from their universities to carry out research that would later be reimbursed by NIE, but regional laboratories would not have such a reserve to draw on. Similarly, in a slack period between contracts the universities might be able to provide some funds to assist the R&D centers. The regional laboratories, however, would have no such financial reserve to draw on. Similarly, the universities might pick up various indirect costs that would not come out of program funds. But again, the laboratories would not have a source of funds for costs of this kind.

85. Mason, Issues Related to the Transfer of the R&D Center and Educational Laboratory Program, op. cit., p. 16.

86. Campbell et al., R&D Funding Policies of the National Institute of Education, op. cit., p. 1.

87. Ibid., pp. 23-24.

88. Ibid., pp. 25-28.

89. Ibid., p. 55.

90. The study referred to here was: Albert Biderman and Laure Sharp, The Competitive Evaluation Research Industry (Washington: Bureau of Social Science Research, Inc., 1972).

91. Campbell et al., R&D Funding Policies of the National Institute of Education, op. cit., pp. 56-57.

92. Ibid., pp. 57-58.

93. Ibid., pp. 47, 50, 62, 63.

94. Ibid., pp. 63-64, 69.

95. Ibid., pp. 13, 31, 63, 73, 78.

96. Ibid., p. 76.

97. Peter H. Rossi, Assessing Institutional Capacity: Some Considerations from the Craftlore of Organized Social Research, Paper prepared for the R&D System Support Division, National Institute of Education, October 25, 1975.

98. Harriet Spivak, Michael Radnor, Victor D'Lugin, and Barbara Vilkomerson, Organizational Capabilities: Design of a Survey Instrument to Assess Organizational Capabilities to Perform Educational R/D&I Activities, With Field Feedback on the Instrument Design (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

99. The NIE project officer indicated a positive response to the instrument design and pilot test indicated above in footnote 98, with the possibility of the instrument's refinement and use in a later cycle of the organizational survey of the Educational KPU Monitoring Program. However, the first organizational survey took considerably longer to complete than had originally been anticipated and there has been no later cycle of the program. The chances of there being a subsequent cycle of the program do not appear to be very strong as of now, though, with or without this additional set of items to assess organizational capabilities.

100. NIE, Research and Development Source Sought for Education R&D System Studies, (Washington: NIE, 1977). CISST was one of several organizations known to us who responded to this "R&D Source Sought" procurement document.

101. This observation was made by an NIE staff member who headed one of the Institute's planning groups.

102. Susan Duffy and Noel Brennan, Status Report on FIS, Internal Memorandum by NIE staff studying the issue of field-initiated studies (Washington: NIE, August 2, 1976).

103. Ibid.

104. It should be remembered that FY73 was NIE's first year of operation and that therefore the immediate funding of unsolicited proposals could not be expected. The Institute needed this period to establish its policies and procedures with respect to these proposals, issue guidelines, and establish the necessary review mechanisms and the field needed a certain amount of time to respond to the established procedures.

105. This table if from the appendix to Duffy and Brennan, Status Report on FIS, op. cit.

106. Ibid.

107. National Academy of Sciences (Herbert A. Simon et al.), Social and Behavioral Science Programs in the National Science Foundation, Final Report of the Committee on the Social Sciences in the National Science Foundation, Assembly of Behavioral and Social Sciences, National Research Council (Washington: NAS, 1976).

108. Mark A. Abramson and Thomas K. Glennan, Grants and Contracts Policies for Social R&D, Draft Paper, Study Project on Social R&D (Washington: National Academy of Sciences/National Research Council, October 1975).

109. Duffy and Brennan, Status Report on FIS, op. cit., also Susan Duffy, Working Drafts in Progress for FIS Final Report, received by us August - September 1976.

110. Duffy and Brennan, "Status Report on FIS," op. cit.

111. Ibid.

112. Ibid.

113. Duffy, Drafts of work in progress, op. cit.

114. Ibid.

115. Duffy and Brennan, "Status Report on FIS," op. cit.

116. The other issue involved the implications of the concept of "regionalism" for educational R&D, an orientation which was receiving strong backing in Congress at that time. The regionalism analysis was taken up some time after our completion of the Agency-Field Relationships (FIS) issue, and was presented in: Durward Hofler, Michael Radnor, and Harriet Spivak, Regionalism in Educational R/D&I: A Policy Analysis for the National Institute of Education, (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

An additional set of analyses had been requested by NIE's Dissemination and Resources Group, to assist them in the planning of their "Dissemination and Feedforward System" (the name was later changed to the "R&D Exchange Program"). These analyses were provided under a separate contract and were published in: Michael Radnor, Durward Hofler and Robert Rich, eds., Information Dissemination and Exchange for Educational Innovations: Conceptual and Implementation Issues of a Regionally-Based Nationwide System (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

117. Radnor, Spivak, Hofler, and Young, Agency/Field Relationships in the Educational R/D&I System, op. cit. We have abstracted from this document in much of the discussion that follows. We have also abstracted segments from an Executive Summary of the Agency/Field Relationships analysis prepared by Virgus Streets, then a member of NIE's planning staff.

118. See especially our chapter on environmental influences on educational R/D&I.

119. Office of the Director, National Institute of Education, Study of Fundamental Research Relevant to Education, 1 page summary of the study request, July 1976.

120. NAS, Fundamental Research and the Process of Education, op. cit. The first draft of this report was available as early as January 1977. The final report was submitted several months later.

121. Ibid., p. 3.

122. Ibid., p. 4.

123. Ibid., p. 1.

124. Ibid., p. 77.

125. Ibid., p. 2.

126. Ibid., Appendix A, Charles F. Turner and Sara B. Keisler, "The Impact of Fundamental Research on the Educational Literature: An Analysis of Citation Patterns."

127. NAS, Fundamental Research and the Process of Education, op. cit., p. 20.

128. This discussion comes from material in Ibid, pp. 50-60.

129. Ibid., p. 51.

130. Ibid., p. 66.

131. Ibid., p. 64.

132. Ibid., p. 66.

133. Ibid., p. 66.

134. Ibid., p. 69.

135. Ibid., p. 74.

136. Ibid., p. 75-76.

137. Ibid., p. 76.

138. NCER Program Committee, Report and Draft Resolution on Fundamental Research Relevant to Education, op. cit.

139. Radnor, Hofler, and Spivak, Strengthening Fundamental Research, op. cit. We abstract heavily from this report in the discussion which follows.

140. National Council on Educational Research, Fundamental Research Relevant to Education, Council Resolution NCER-GP-77-02, September 16, 1977.

141. Mason and Nelson, "Federal Funding of Educational R&D: R&D Function by Agency," op. cit. We added the underlining for emphasis.

142. Ibid.

143. Ibid.

144. Ibid. Mason and Nelson cite H. Brooks, Government and Science (Cambridge: MIT Press, 1968) as a reference for the "overhead" approach to the support of indirect strategies.

145. Ibid.

146. Ibid.

EDUCATIONAL RESEARCH, DEVELOPMENT,
AND INNOVATION: THE INSTITUTIONALIZATION
OF CHANGE IN EDUCATION

CHAPTER SEVEN

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CHAPTER SEVEN

INFORMATION FLOWS

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Page

Information flow is a critical element in the functioning of any R/D&I system. It is essential to the development of a cumulative knowledge base to enhance the operations of each separate R/D&I function, to permit the integration of R/D&I activities across functions, and to provide the kinds of criticism and feedback needed to improve R/D&I outputs. The literature suggests that major advances in the knowledge base of a field come about through the formulation of new theoretical paradigms,[1] followed by information exchange among researchers critiquing and exploring the implications of the paradigms and looking for problems and errors in need of revision or ways to apply the paradigms. Further, it appears that major advances are rarely made by individuals working in isolation. More often, what is needed is a critical mass of talent interacting, either in the same organizational setting[2] (micro level information flow) or through well established communication channels in the field as a whole (macro level information flow).

Information flow in education is clearly one of the most significant points of weakness in the field's basic capability for advancement. We have come across information flow problems in our analysis of virtually every R/D&I function we have considered -- those functions on the KP and the KU ends of the KPU spectrum, and the linkage functions in between. Our analysis suggests that several kinds of interventions in the existing patterns of information exchange could provide leverage for improving the total KPU system of the field. We explore some of these in this chapter, after presenting our analysis of existing patterns of information flow in education and the kinds of problems that characterize those flows.

At least three distinct patterns of information exchange need to be considered to understand information flow problems, and attendant policy and management issues, in education: (1) KPU information flows within and among R/D&I systems external to the operating system; (2) KPU information flows within the operating system; and (3) KPU information flows between external R/D&I and operating systems.

We discuss the latter two patterns of information flow elsewhere in this volume. Our chapter on the dissemination function in educational R/D&I takes note of many of the weaknesses in information flows between the KP and KU communities in education. And information flows within the operating system are given some attention in our chapter on the implementation and utilization functions in educational R/D&I. We will therefore restrict our attention in this chapter to the KPU information flows within and among R/D&I systems external to the operating system.*

For the most part, this entails analysis of the exchanges of scientific information in the research community. Although it would be useful to have information about information flows among development specialists, or dissemination specialists, or change agents, there is as yet little in the way of organized professional "communities" or networks in these speciality areas, relatively weak and diffuse information exchange channels, and no research that we have been able to locate on information flows in these professional communities. There is a clear need for research of this kind. However, for the present, we will attempt to synthesize only the literature that is already available, and therefore the narrowing of our subject matter should be clear to the reader. We will be alluding to the broader domain but focusing here on information flows in the research community.

*In a subsequent draft of this chapter already in preparation, we will be dealing with the broader topic of information flows: including information flows among R/D&I specialities other than research and also covering information flows within the operating system and between the practice and R&D communities. Much of the material presented here is in summary form in the current draft.

I. KPU INFORMATION FLOW EXTERNAL TO THE OPERATING SYSTEM

We include under this heading all information flows that impinge on the need identification, research, development, and evaluation operations that take place in KP organizations external to the operating system. For ease of presentation, we use the terms "researchers" and "research" as shorthand references to all personnel and functions on the production end of the KPU spectrum. Therefore, when we write, for instance, about the social organization of "researchers," or about information-seeking behaviors of "researchers," we are in fact referring not only to those who identify themselves as researchers but also to developers and the evaluators who work with researchers and developers in product design, testing, and refinement. Similarly, when we consider "research" areas, we are including here not only topics or problems actively pursued by researchers but developers and R&D evaluators as well.

In generic terms, information flow systems in all knowledge-producing fields (particularly scholarly fields) can be described in terms of the following elements and their interrelationships: (A) the research areas that make up the active research front of knowledge production in the field; (B) the social organization of researchers working in each research area; (C) information exchange surrounding professional association meetings; (D) the primary publication outlets of a field; (E) the secondary publications that facilitate synthesis of new knowledge and retrieval of written sources of information; (F) the information-seeking behaviors of researchers in attempting to meet their information needs; and (G) formal information systems and agencies established to acquire, store, and permit retrieval of information. The literature is highly suggestive about what each of these elements might look like in an idealized KP information flow system, and how far from that ideal information flow is, in education as well as in other sectors.

1. The Relevant Literature

A well developed, cumulative, highly useful literature on information flow systems appeared in the late 1960s and early 1970s. From this literature, we can get a very clear sense of how information flows in highly developed scholarly disciplines such as the physical sciences, and what some of the key weaknesses are in the patterns of information flow that characterize other fields of study such as education. We have found four bodies of literature particularly helpful for our analysis.

A. Analyses from the Sociology of Science and the Information Sciences

A fascinating literature appeared in the 1960s on the growth and decline of research areas and the patterns of social relationships among researchers that accompany the emergence, development, and later decline of a research area. The seminal work here was Kuhn's The Structure of Scientific Revolutions which first appeared in 1962.[3] This study stimulated research on the social structure of scientific fields and technologies and the various kinds of communication mechanisms (both formal and especially informal) which facilitate information flows and provide quality control in the cumulative development of the knowledge base of a field. Some of the most exciting work in this area was done on exploring the phenomenon of "invisible colleges" as a particularly effective form of social and communication structure approached in varying degrees by different research areas.[4]

In addition to the emphasis in much of this work on the importance of the informal communication mechanisms of a field, a good deal of empirical work was also focused on the formal communication mechanisms of a field, particularly its association meetings and journal outlets. Most of this body of research was done by Garvey and his associates at John Hopkins University who studied the functioning of scientists and engineers in nine disciplines or fields of study, including education.[5] The work of the Hopkins group is especially interesting because it provides comparative data and a comparative perspective across different fields.

B. Empirical Investigations of Information Flows in Education

The American Educational Research Association (AERA) played a major role in the late 1960s and early 1970s in promoting, sponsoring, and serving as a forum for analyses of information flows and communication networks in educational research. This seems to have reflected the interest of the AERA leadership at that time in stimulating the development of the field of education in the direction of the scholarly disciplines. AERA statements have taken note of the significant applied component in much of educational research, and the association has taken pains to describe itself in terms of the D as well as the R in "R&D."[6] Still, the AERA viewpoint implicit in its publications on information flow seems to reflect the suggestion by a discussion in one AERA symposium that the field should try to act like a discipline even if it is not one.[7]

Much of the literature on information flow in education was published by the AERA (particularly in its journal, The Educational Researcher and the American Educational Research Journal).[8] And too, much of the research that has been conducted on the topic has come about through the active cooperation of the AERA or the activities of some of its work groups (for instance, its Subcommittee on an Abstract and Information Retrieval System for Educational Researchers).[9] The AERA was one of the nine professional associations to join in the study of Garvey and his associates at Johns Hopkins. And several of the analyses that have appeared are based on research done on the AERA's 1968 annual meeting and the research presented there.[10] Nelson, who was a member of the Garvey research team, produced several pieces on this research as well as additional studies on the field's journals and information-seeking behaviors, and then continued to publish thought-provoking pieces in the Educational Researcher on the weaknesses of the field's communication mechanisms.[11] In addition, the AERA published a symposium of pieces that brought together the work done on information flow in other fields with the work done by the Garvey group, as well as a discussion of the "invisible college" idea as it might apply to education, and some overview pieces suggesting that at that time the AERA was considering moving in the direction of more active intellectual as well as political leadership of the field.[12] We shall consider all of this literature in some detail in our presentation.

C. Analyses of Information-Seeking Behavior in the Disciplines and in Education

Several analyses have been published about how researchers go about seeking information, their information needs and information-seeking styles, and the implications of all this for institutions, agencies and formal information systems established to permit acquisition, storage, and retrieval of needed information.

The best single source on all of this is a review article by Crane,[13] who came from Johns Hopkins and who has herself contributed several important pieces of research in this area including a volume on invisible colleges.[14] What makes the Crane review particularly helpful is that it not only provides an overview of the literature on information-seeking behaviors but also synthesizes it with the material on the growth of research areas, the social organization of research areas, and formal and informal communication mechanisms. For us, it was clearly the single most helpful source in the whole literature on information flow.

In addition to Crane's analysis, there are several other pieces in the literature on information-seeking and information needs,[15] including some particularly focused on educational researchers and practitioners.[16]

D. Literature on ERIC and Other Formal Information Agencies, Institutions, and Systems

The field of information science produces a good deal of literature for its own internal consumption; it has even reached the stage of development where the field produces an annual review volume of the state of knowledge on different key topics.[17] Some of the literature is helpful for providing insight into some of the generic issues of information flow that plague libraries, computerized information retrieval systems, and other agencies and mechanisms that have been established to facilitate information flow.[18] The ERIC system has produced a large literature about itself, and some of this is also useful for identifying some of the information flow problems that continue to be troublesome for educational KPU despite the vast investment of resources that has been made in ERIC.[19]

In the sections which follow, we will summarize what we have learned from all this literature -- about information flow in education and in other fields -- and we will consider a number of possible policy and research implications.

2. KP Information Flow Systems: Generic Model

A. Research Areas

Theoretically, any field of knowledge production is divisible into a number of actively pursued research areas, each defined as "a set of closely related problems that is viewed by scientists who study them as a discrete entity."[20] The research front of a particular field of knowledge at a given point in time may be made up of hundreds of such distinct research areas, linked at various points of overlap where one research area is drawn on in exploring another, etc. Hypothetically, it should be possible to map these research areas, showing how closely or distantly related they are, one to another, where the points of overlap are, and how the research areas of one field draw on (and therefore overlap with maps of) the research areas that fall primarily within other fields. The linkages and areas of overlap can be determined by analysis of citations and patterns of informal communication among researchers trying to find and exchange information.

Research areas are dynamic -- constantly changing, appearing anew, growing, declining. At any one point in time, a map of the research areas of a given field might include some at each stage in the research area life cycle of slow growth, exponential growth, linear growth, and gradual decline.[21] The stage reached in the life cycle of any particular research area is determined by analyzing for each year the number of new publications and the number of researchers publishing for the first time in the research area.

B. Social Organization of Research Areas

a. Prerequisites for Emergence of Social Organization of a Research Area

The concept of a research area is tied inextricably to the notion of the social organization of a research area. A social system of informal communication networks emerges as a research area experiences rapid growth. As described in the literature:

> Growth of an area is stimulated by intriguing findings or by a new and untested theoretical model . . . . These ideas attract scientists to the research area, which begins to expand rapidly in terms of publications and authors. A few highly productive scientists set priorities for research, recruit and train students, and maintain informal communication contacts with other members of the area. As the implications of the seminal ideas are exhausted or become increasingly difficult to test, new scientists are less likely to enter the area and old members are likely to drop out; this leads to the gradual decline of the size of the membership area.[22]

The prerequisites for the emergence of such a social system appear to be institutionalization of the research role, rapid growth of the research area, and social contacts among researchers. Wherever a significant amount of social contact and informal communication develop among researchers working in a given research area, it becomes possible to talk about the social organization of a research area and the existence of a "research community"[23] tied together by a set of intellectual problems.

b. Patterns of Social Organization

Several patterns of social organization have been delineated within research areas -- e.g.: "social circles," with vague boundaries and no formal leadership but much indirect influence and interaction within the circle; "solidarity groups," such as a teacher and his students and collaborators; "highly coherent groups," such as a school of thought that is trying to overthrow the dominant position in a discipline or research area; "loose communication networking," where scientists have various kinds of loose ties and contacts with researchers in their own and other research areas.[24] The one pattern that has excited the most interest is the most highly developed of the forms of social organization, the "invisible college."[25]

c. Invisible Colleges

An invisible college is described generally as a relatively small group (100 members at most) of eminent, productive scientists in a research area, who maintain frequent, informal contact with one another through such means as preprint exchanges and participating in the same "commuting circuit of meetings and collaborative projects.[26] Within any invisible college, we tend to find a heterogeneous social organization made up of a few stars surrounded by a larger number of demistars and satellites. Included may be not only active knowledge producers, knowledge synthesizers, individuals who serve the group politically or administratively (e.g.: in NIE or AERA), and various others characterized as troubadours (carriers of up-to-date news and gossip through the college) and scouts (knowledge providers).[27] They review each other's books and referee each other's articles, thereby assuring the publication of these works, even when the manuscript is submitted with the author's name removed. This happens because they share the same pattern of thinking, the same jargon, the same methods, etc., and therefore find each other's work totally acceptable, and generally moreso than the work of another author who uses different jargon, methods, etc. Often they received the same training at the same universities (characteristically "starting at a major university under the sponsorship of a major figure in the field"),[28] and therefore the invisible college functions somewhat in the manner of an "old boy network," with or without intent. Members of the invisible college know each other, and they respect each other's work and capabilities. They further each other's influence through recommending one another for opernings on editorial boards, advisory groups, or review panels, or for positions as consultants. And of some significance in identifying a specific invisible college, they cite each other's work and build on each other's findings.

There have been some methodological problems in identifying actual invisible colleges in many fields.[29] It is unclear whether that should be interpreted to mean that they do not in fact exist in these fields, or that they exist but the methodology for identifying them is not yet sufficiently developed. Regardless, the question of importance to policy makers may not be so much whether they already exist in a given field, but whether it is possible to create them by active policy intervention. The importance of this question cannot be overestimated: for achieving the basic goals of any knowledge producing field, the invisible college mechanism is far superior to any other form of social organization operating in research areas.

To develop a high quality knowledge base as rapidly as possible, cumulative knowledge production is essential.

A few major advances in a field may seem unrelated to all that has gone before, but the great bulk of knowledge production in a field builds cumulatively on previous work. (Even the major advances when studied carefully enough are likely to show the influence of earlier theorizing or empirical investigation.) Each research area, therefore, needs integrative mechanisms that function to place and keep the researcher in touch with all relevant work that has preceded him and all that is going on at the same time elsewhere.

The invisible college of a research area is made up of those researchers, still actively producing, whose work shaped the definition of the area end the problems of concern to those working in it. They are thoroughly familiar with all the work produced by themselves and their colleagues and the leasers of the research area who preceded them. One assumes, then, they could easily quote chapter and verse to anyone in need of readily identifying the research area's seminal works, major theoretical pieces, key empirical investigations, and explorations of problems, implications, applications, etc., or to anyone seeking to locate portions of that cumulative knowledge base relevant to a given problem.

Through the day-to-day communication that flows through the invisible college, members also are familiar with work in progress throughout the research area -- who is working with whom, where, on what questions, using what approaches, with whose funding, and with what results. Consequently, members of the invisible college are not only excellent sources of information themselves, but serve an important function in channeling inquiries to other sources of information -- who to ask about information on x or y, or the best sources to read on z. The functioning of an invisible college, therefore, can make information-seeking within a research area less random and more efficient.

Even where information is not sought, the day-to-day communication among invisible college members serves to channel information to those who might be able to use it -- at a time when it can have some impact on their own work. The invisible college member "selects information of interest to his colleagues; he passes it on while it's still fresh; and he adds his own expert opinion in an editorial comment or two."[30]

The invisible college not only facilitates information flow among its members, but also between its members and others outside the invisible college who are working in the same research area. Invisible college members in a given research area are likely to be working in numerous R/D&I institutions and settings dispersed across the country, and each invisible college member is likely to have his own network of "followers" -- present and former students, collaborators, colleagues, etc. The flow of information can be visualized in terms of the classical two-stage diffusion model.[31] First, the invisible college serves to diffuse information among its geographically dispersed members. Then, these eminent researchers function as gatekeepers selecting and diffusing information to other researchers in networks emanating from them. As a consequence, the best, most authoritative, most useful information and insight diffuses throughout the research area, from its leadership at the center outward to others at the periphery, integrating knowledge production in the research area.

Cumulative development of a high quality knowledge base id dependent on this kind of accessibility to information about relevant previous and current work. It is also dependent on the functioning of mechanisms that provide a measure of quality control on the knowledge and other outputs being produced, especially those outputs that achieve archival status through publication in the journals and other outlets of the field. An example of such a quality control mechanism would be the referee system through which manuscripts are accepted or rejected for publication. But mechanisms of this kind are slow, and occur late in the knowledge production process, too late to have much impact on the particular reported investigation while it was in progress. The invisible college, where it exists, is far more efficient. It "reacts quickly and authoritatively"[32] to new ideas, new theories, new approaches, new findings, etc., identifying conceptual or methodological weaknesses before presentations enter the journal literature.

The information that flows through the invisible college tends to be primarily about work in progress, from even the earliest stages of conceptualization and search for funding. Invisible college members can provide reactions and critiques quickly so that false starts are avoided. And where a proposed or ongoing investigation is judged sound, invisible college communication can provide helpful guidance and insight, suggestions about questions to be investigated, variables to be included in a research design, appropriate methodology, etc. In short, the invisible college, where it exists, provides the most effective and efficient mechanism we know of to facilitate the rapid expansion of a research area, to speed the quantity, and to sharpen the quality, of knowledge production in a research area. In developing policy options to enhance information flow, then, careful consideration should be given to the possibilities of creating invisible colleges where they do not yet exist.

Whatever the form of social organization of researchers in a field -- whether invisible colleges exist or some other looser form of communication networking -- the social system functions to move new knowledge from the research area to the informal and then to the formal communication mechanisms of a field. This is demonstrated most clearly in the literature on information exchange surrounding professional association meetings.

C. Professional Association Meetings

Comparative research across several knowledge producing fields suggests that presentations at professional association meetings represent a key point of linkage between a field's informal and formal communication mechanisms.[33] As we have seen, in fields with well developed social systems and close integration of informal and formal communication mechanisms, dissemination of information about a given piece of research begins while the work is still in progress. Those working on similar or related problems are known to one another. They correspond and stay in contact with one another through various informal channels. Progress reports are made at various colloquia and in local, regional, and other meetings of professional and industry associations. Through these contacts, the researcher begins to get informal feedback on his conceptualization of the research problem, his methods, tentative findings, etc. Where it seems warranted, he may, as a result, modify his work (or the manner in which he reports his work), or reanalyze or reinterpret his data. When the investigation has progressed to the point where the researcher feels confident enough in his findings to disseminate them formally, he distributes early drafts of his manuscript to those he considers knowledgeable to react to and critique his work. This circulation of manuscript drafts is generally referred to as the "preprint exchange." Based on the feedback received, the researcher may revise his presentation further, or perhaps decide to conduct additional data gathering or analysis before disseminating his findings formally.

National meetings of professional associations continue this process of informal feedback by bringing the researcher into contact with a greater number of colleagues and providing a setting for intensive face-to-face information exchange among researchers working on similar or related problems. In fields with well developed social systems, this intensive information exchange is the essence of what goes on at the national meetings. Since those presenting papers and those attending these sessions are already familiar with each other's work, little time is wasted on describing the work. Instead, the bulk of the time is spent on analyzing and critiquing the work, exploring its implications, relating it to other work and potential applications, etc. Consequently, the national meeting is a significant stimulus for new research and an important source of information for revising, refining, or elaborating the work of both paper presenters and those who attend the presentation sessions. The national meeting, then, is an important element in facilitating information flow through a field and the social contacts that expand and strengthen informal communication networks. For the young researcher, the meeting provides an especially important entry point to the informal communication networks of his research area.

The national meeting of a professional association also functions as part of the formal communication mechanisms of a field. Presentations at national meetings announce the work to a broader audience in the field, beyond the charmed circle of the invisible college (or other informal communication network) already familiar with the investigation while it was still in progress. Papers presented at the meetings flow into the formal archival mechanisms of a field through publication of abstracts or Proceedings, or through automatic inclusion in various collections of papers or document storage and retrieval systems. In some fields, one even finds special consideration given to manuscripts based on national meeting presentations for publication in the journals of that society or association.[34]

D. Primary Publication Outlets

In knowledge producing field with optimal information flow, manuscripts based on national meeting presentations appear in a field's primary publication outlets with a minimum of delay. Since fields with optimal information flow are generally those characterized by a high level of intellectual consensus on concepts, theories, methodology, etc., relatively few manuscripts are likely to be rejected or to require the time-consuming revision-and-resubmission process.

These fields with optimal information flow also tend to have highly structured publication channels -- a relatively small number of "core journals" and "tangential journals," either covering all the key work in the field or specializing in certain research areas within the field. This structuring of publication outlets tends to facilitate information flow. The fewer the number of journals, the easier it may be to locate all the key work in a research area relevant to one's own investigation. All published articles on a given problem are likely to be found in one, two, or certainly no more than a handful of journals. Authors who published one manuscript on a given problem in a particular journal are likely to publish subsequent work on that problem in the same journal. Consequently, structured publication outlets of this kind provide a sense of continuity for the casual browsing reader, and simplify literature search for the researcher actively seeking and trying to get a firm grasp of, all relevant previous work on the problem.

E. Secondary Publications

Even in knowledge producing fields where primary publication outlets are less highly structured, effective information flow is possible if an adequate system of secondary publications exists to facilitate literature searches, retrieval of written sources of information, and synthesis of new knowledge. We include here indexes, abstracts, and review articles. In a highly effective information flow system, all journal articles, technical reports, papers presented at professional association meetings, and other fugitive literature judged of high quality and relevance to a given research area are both indexed and abstracted, using one comprehensive and consistent set of descriptors. The descriptors are consistent with both general bibliographic labelling schemes and specialized usage in the research area concerned. Abstracts are sufficiently detailed to provide information about theoretical framework, methodology, findings, recommendations, significance, etc.

In an effective information flow system, review articles covering the research area as a whole and specialized concerns are produced frequently, on a periodic basis, either by leading men in the field's invisible college or under their editorial supervision. Each review article provides a history and synthesis of previous work and ongoing work, suggesting the state of development of the research area, what is known and what is not yet known that needs to be known, which questions have been answered and which issues remain unresolved, which problems in methodology have been clarified or eliminated and which ones remain, how our understanding of the key problems of the research area has changed over time, and which pieces of the literature must be read to understand what we do and do not know about x or y, etc. Each review article is sufficiently comprehensive so that it covers the entire literature of the research area (or specialized concern within the research area), separating the wheat from the chaff and pointing the reader to only those items that warrant archival status as important elements in the knowledge base of the research area.

F. Information Seeking Behaviors

Personnel in all R/D&I systems can be studied in terms of their information-seeking and information-exchange behaviors. Information "user" studies focus on such topics as: information "needs"; information utilization patterns (e.g., preferences among types of information sources, frequency of use, amount of demand for certain kinds of information or types of sources or services, user satisfaction with services); and sophistication of users in making use of available channels.[35]

Studies of information needs and uses suggest that information seeking behaviors of researchers are affected by a number of factors including: the nature of the field of study (e.g., hard vs. soft science, technology, nonscience, pure vs. applied, a "conjunctive"[36] domain such as education); the stage of maturity of a particular research area; the state of development of the social structure of the research area; the natuer of the formal archival publication base as it affects the ease or difficulty of informationa retrieval; the information seeker's own research and disciplinary background in relation to the research problem and discipline in which he is seeking information; the researcher's relationship to the informal communication channels of the research area; his own ability to retrieve and process information from different sources available in different forms; the researcher's purposes in seeking the information and his own preferences as to sources of information; etc.

This can be illustrated by examining the effect on information-seeking behavior of one's relationship to the informal communication channels of a research area.[37] The data suggest that in all fields of study, interpersonal communication is a major source of information and generally is the preferred source. If one is a part of, or has access to, the informal communication network of a research area, one can locate new leads and find information efficiently without having to resort to random searching of the literature. One's sources of information (especially if they include some of the more knowledgeable leaders of a field) can tell you who is working on what and what he's finding, what methods have been tried and proved ineffective and why, what is worth reading to familiarize oneself with the most significant work done in the area to date, etc. If one is isolated from the informal communication network of a research area (or if such a network is diffuse or even non-existent), it is harder to acquire this kind of information, and especially harder to determine which leads are worth pursuing and which ones are likely to be unproductive. Much time is lost in random searching of the literature and in trying to run down leads that turn out to be unhelpful.

When the researcher delves into questions outside his own research area, he is generally isolated from the informal communication network of this other research area, and therefore confronts the same problems as the researcher isolated from the informal communication networks of his own field. But in the case of trying to locate information outside his own research area, there is a further problem in using the formal communication system of journals, indexes, abstracting services, etc. The concepts and terminology that researchers use to think about and talk about their work (i.e., the jargon of a research area) change with advances in the research front of a field. However, the jargon in use tends to change faster than the terminology and classification schemes used by journals, indexing or abstracting services, or library catalogues. The researcher working within his own research area is likely to be able to make the transition from current terminology to the older labels. However, as the scientist gets further from his own field, it is harder for him to interpret and translate the labels in the indexes, etc. into the current jargon with which he is more familiar, and he has less access to members of the informal communication network of the research area who could do this label translation for him or point him directly to the information and/or information sources he needs. Consequently, information seeking behavior becomes more oriented toward the formal archival publications of a field, its secondary publications, and its information systems. Where there is a strong base of review articles, critiques, and knowledge syntheses that can be used, information-seeking is likely to follow a pattern of citation use and be reasonably efficient. However, where such secondary sources are lacking or inadequate, more random search behaviors become necessary, they are generally discouraging and often fruitless (or worse, they lead the researcher down what turns out to be the wrong paths), and KP activity is retarded.

Clearly, then, even where a researcher is well trained in the information resources of his own field, information flow becomes a substantial problem as soon as his research problem takes him beyond the narrow domain of the area in which he has been trained. Development of strong social structures and communication flows within major research areas, and development of arrangements that would link workers in one research area with the informal networks in other areas (as needed) would greatly facilitate smooth information flows, more efficient information-seeking bhavior, and ultimately more rapid development of high quality, cumulative knowledge bases in key research areas.

G. Formal Information -Systems and Agencies

All fields have formal information systems and agencies that permit the storage and retrieval of accumulated knowledge that has achieved archival status in the field's publication outlets. Until recently, the category of formal information systems and agencies was made up largely of libraries, with their specialized or general indexing and cataloguing systems to permit information to be readily stored and just as readily retrieved.

Computer technology has transformed the nature of these formal information systems and agencies, their scope, and the kinds of services that can be provided.[38] Not only can enormous amounts of information be retrieved in a few seconds by a computerized retrieval system, but even more important, different information systems can be hooked up into larger networks, permitting users in one locale to make use of information stored in a large number of information centers all over the country (or even the world), and all of this can be accomplished in only a few minutes time. The computer capabilities minimize the clerical chores entailed in information gathering, make more information accessible to the user, and accomplish the information gathering task in a miniscule fraction of the time that previously was required to amass the relevant information.

Information networking has opened an enormous potential. However, significant difficulties have been encountered in designing and managing such systems for wide use. The crux of the problem lies in the enormous gap between potential system capabilities, on the one hand, and the known information seeking behaviors of researchers, on the other. Theoretically, one would assume that the design and management of an information system should proceed smoothly and logically from determination of users' information needs and information-seeking and exchange behaviors to design and management of a system that meets those needs and facilitates those information-seeking and exchange behaviors. However, user studies suggest that it is difficult if not impossible to adequately determine user needs. This is a result of both the rudimentary nature of the methodology of user studies and the fact that users generally lack sophisticated awareness of their needs and rarely articulate the kind of information about their requirements that could be used to guide the design and management of an information system. Also, equally important, since information users generally are unsophisticated in information seeking, basing system design on what users do now instead of what they might do if their information seeking skills were better developed would not lead to development of as good a system as might be developed simply by having information specialists conceptualize and design a first-rate information system.

All information systems, then, must face the design and management issue of determining the extent to which, on the one hand, the system should be suited to the existing information-seeking and information-exchange styles of users, or, on the other hand, the extent to which the focus should be on increasing the capabilities of users to more effectively seek, exchange, and use information so that the full potential utility of the system can be exploited. Clearly, the ideal policy mix would be to: (a) try to design the most advanced and useful system possible, while also (b) developing mechanisms to fit the system to the information seeking and processing styles of users, and (c) developing strategies for increasing user capabilities for using the system to its full potential. Given limited resources, however, the key policy issue will entail determining how to allocate funding among program components oriented toward each of these three objectives.

H. Summary

Ideally, information flows in a research area are highly efficient. Researchers are well connected to each other through informal communication channels which speed the flow of up-to-date, high quality information. The annual meetings of professional associations facilitate these informal information flows and the establishment of linkages among researchers which bind them to these informal communication channels. The formal publication channels are so structured that cumulative bodies of research are easy to locate, and secondary sources permit easy retrieval of the first-rate work in an area that forms the core of its knowledge base. Researchers are efficient in information-seeking and exchange, having well developed and sophisticated skills in use of the existing informal and formal information channels. And information systems and agencies permit efficient storage and retrieval of all high quality knowledge in an area by users adequately trained to exploit the full potential of the information system's design.

Of course, not all fields of knowledge show well developed information flow patterns. Education is a special case in point, and we turn now to consideration of information flow among researchers in education.

.3. KP Information Flows in Education

Fields of knowledge vary in the extent to which they approach the description we have provided of optimal information flow. But of all the fields that have been studied comparatively by researchers,[39] education clearly must be rated the weakest in information flow.

A. Research Areas

No field has devoted any energies to identifying and mapping its research areas. But clearly, this would be a relatively simple task to accomplish in many theoretical sciences. As we shall consider subsequently, in education the problems would be enormous. The root of much of the difficulty is traceable to the inherent nature of education as a conjunctive field of knowledge.[40] But this factor can be overemphasized. If informal communication networks were well developed in education, it would be easier to define, bound off, and trace the interrelationships among its research areas.

B. Social Organizaton of Researchers

Social organization among educational researchers is barely in ividence. Where it does exist, it is relatively unstructured and of limited utility for furthering the kind of information flow that is essential to developing high quality cumulative knowledge bases. Informal communcation networks may exist for a time between a teacher and his students, and among the students themselves, but most of these tend to attenuate and disappear after time. In education, there appears to be somewhat limited continuity in the work of most individual researchers[41] much less teacher-student groups who might have worked together as a research team while the students were in graduate school. Much the same could be said about informal communication between one-time collaborators, or between researchers pursuing similar research problems who might have met at a professional association meeting and corresponded for a while. Given the general lack of continuity in the work of educational researchers, these channels lose their efficacy for information flow as individuals change research interests and move on from one "one-shot study" to another.[42]

There are, of course, exceptions -- numerous eminent researchers who have pursued work on a related set of problems for many years, even a total research career. They and their students and collaborators are more likely to remain in contact and to have some contact with other researchers studying similar problems. But this kind of communication network is at best a communication network covering a portion of those working in the research area, not a comprehensive communication network linking all the researchers, or even just the leading researchers, in that area.

The creation of SIGs (Special Interest Groups) as organizational entities within the AERA might have been intended as a development in this direction. But, clearly, few of these groups succeed in doing any more than providing extended and continuing social contact and communication channels for those researchers who decide to join these groups and take part in their activities. Rather than functioning in the manner of invisible colleges of the most eminent and productive researchers in an area, casual observation suggests that many of the SIGs tend to be joined by young researchers early in their careers, interested in making and extending their professional contacts.

C. Information Exchange Surrounding AERA Meetings

The lack of social organization among educational researchers working on related problems has a pervasive influence on information flow in education. The effect is seen especially clearly in the national meeting of AERA.[43] Compared to other fields that have been studies, the data on education show less pre-meeting dissemination of information about the studies reported in paper presentations. But even more important than the amount of pre-meeting dissemination is the relatively unstructured quality of the dissemination that does take place --

oral presentations to small informal groups (e.g., work groups or colleagues within their institution), or written presentations in the form of technical reports or doctoral dissertations. Nothing exists like the informal communication network of an invisible college, or even a looser pattern of communication networking to integrate informal communication and diffuse throughout a research area up-to-date information about work in progress. Consequently, compared to other fields, educational researchers who attend AERA presentation sessions are significantly less familiar with the studies being presented or the prior work of the presenting suthors, and the presenting authors are far less likely to be familiar with those other researchers who attend the presentations or the work they have been doing. Since there is little prior knowledge about the presentations or the work in progress, considerable energy must be devoted to absorbing and assimilating an extensive amount of complex information about a study from a brief, usually ineffective, oral presentation -- hardly an efficient medium for information flow. At best, those who bother to take part in these generally deadly dull sessions succeed in developing an awareness of what is going on, rather than extending communication about the substance of investigations.

Participants are "forced into an unstructured pattern of information-seeking behavior, the point of which is not to assimilate the information itself at the meeting, but rather to uncover sources of information"[44] -- who is working on what, whose papers to request, who to try to contact. They browse through the meeting program, check off interesting-sounding sessions, and wander from session to session -- listening for a while, getting bored, trying another session, moving on, after a day or so getting so bored that fewer sessions are attended and more time

In short, the national meeting achieves little in the way of genuine scientific information exchange. It provides, at best, a medium for trying to locate, in a somewhat random and unstructured manner, the most superficial kinds of information that would flow through day-to-day informal communication channels in a field with a well developed social organization. And if the national meeting fails to provide a forum for intensive face-to-face information exchange, the extent to which this happens at all in a field is bound to be limited -- a special conference or seminary here, a set of colloquia there.

Concern has been expressed about this problem within the AERA and federal agencies. Several mechanisms have been devised to familiarize educational researchers with work in progress or work to be presented at the national meeting. For instance, ERIC's monthly abstract publication Research in Education was intended to provide up-to-date coverage of work in progress through abstracting technical reports and the fugitive literature forthcoming from ongoing projects. And publication of AERA paper abstracts prior to the national meeting was expected to familiarize readers with presentations prior to the meeting. Data suggest that neither device is succeeding: Research in Education covers too small a proportion of all work in progress to be useful for this purpose, and few of those who attend paper sessions bother to read the abstracts prior to attending the sessions.[46]

AERA has also been experimenting with a number of new formats designed to increase the amount of information exchange occurring at its annual meeting. There appears, for instance, to be an especially pronounced increase in the use of symposia designed to provide diverse presentations on a single issue, oriented toward stimulating exchanges among participants and between participants and attendees. To stimulate discussion in certain areas, sumposia may be organized by the Association, by Divisions, or by Special Interest Groups, as well as proposed by AERA members. There are also a number of new formats, such as critique sessions, small roundtables, and conversation hours. Many of the symposia are well attended, the exchanges are at times lively, and much of the discussion among participants and attendees does continue after the sessions are concluded. It would be useful to have a formal assessment of the effectiveness of these new types of sessions, but none has yet been made.

D. Primary Publication Outlets

We have noted above that information flow in educational research is hampered by widespread ignorance of pertinent information in one's own research area, and that this is attributable primarily to the relative lack of social organization of the field. We have considered particularly how the educational researcher's lack of familiarity with work in progress impedes information flow at national meetings. But this is only a small part of the problem. Data show that educational researchers tend to be unaware of published articles relevant to their own work. This is traceable to two additional problems in the information flow system of the field: journal outlets for publication in education are so numberous and diffuse that it is difficult to keep up-to-date in one's research area; and the field lacks adequate mechanisms for providing comprehensive abstracting and information retrieval.

Unlike the fields with highly structured publication outlets -- a few core journals and perhaps a handful of tangential journals -- there are several hundred journal outlets for educational research. One survey, asking 562 knowledgeable respondents in the field of education to name periodicals they read regularly to keep up-to-date in the field, produced a list of 357 periodicals read by at least two of them.[47] Clearly, many of the periodicals named were targeted more at pracitioners than researchers adn should probably not be considered journal outlets to which educational researchers would be likely to submit manuscripts, or which educational researchers would browse on a regular basis. But in another study, 121 authors who presented research papers at a single AERA meeting named 72 different journals to which they planned to submit their manuscripts.[48] In still another study, 94 authors named 84 different journals to which they planned to submit 172 different manuscripts.[49] Clearly, then, the number of educational research journals in which a given manuscript might be pubished is quite large.

The large number of journal outlets for educational research is an especially serious problem because the journal literature of the field is so diffuse and unstructured. There are few specialized journals that publish research on topics narrow enough to approach our conception of a research area. Most of the journals cover the field of educational research as a whole, or rather broad segments of the field as a whole (e.g., urban education, the sociology of education, etc.). Consequently, for the educational researcher to keep up-todate in his research area, it might be necessary for him to peruse as many as 20, 30, or even more journals. Even if he is highly selective about the journals he reads, it is likely that 10-20 would be a bare minimum of the journal literature that he must browse.

The problem is further complicated by the limited continuity one finds in both the conduct of educational research and its publication patterns. Several observers have commented on the non-cumulative "one-shot" study as the characteristic pattern of educational research, and data confirm this observation.[50] For instance, analysis of the papers presented at a single AERA meeting showed that 88% of the presentations described a single laboratory, field, or methodological study rather than reporting on a program of studies.[51] Compared to other fields, doctoral dissertations in education are far less likely to be undertaken as part of a broad research program, conceived and sponsored by a scholar-teacher who serves as the doctoral adviser. More typically, doctoral students generate research topics on their own, unrelated to the work of their professors (who are also less likely than those in other fields to be involved in a research program of their own), and then expend a considerable amount of energy in trying to locate a faculty member willing to serve as their adviser. Educational researchers are less likely than researchers in other fields to continue work in the same area as their doctoral dissertations, or to publish several articles on the same or related research problems.[52] Consequently, it is less likely that an educational researcher working on a given problem will be familiar with other researchers working on that same problem or publishing in that same area.

Even in cases where the work of a researcher has continuity, the diffuse and unstructured nature of publication outlets in educational research makes it difficult for the reader to follow a given author's progress in answering a series of related questions. Few educational researchers who publish an article on a given topic in a particular journal are likely to submit their next article on the same topic to the same journal. More likely, the subsequent article will be sent to some other journal. In one study, authors who had recently published articles in four core journals in the field were asked about current manuscripts they were preparing on the same topics and which journals they were planning to submit them to: 94 educational researchers who were preparing 172 manuscripts named not only the four core journals but a total of 84 different journals, with no one journal slated to receive as many as even 10% of the manuscripts.[53] In still another study, these authors who had published in the four core journals were asked to name other researchers working in the same research area, and these other researchers were then contacted to determine where they had published their most recent article in this research area: 67 researchers reported articles appearing in not only the four core journals but in a total of 45 different journals.[54]

Clearly, then, core journals in education fail to provide comprehensive, up-to-date, integrative coverage of research areas. And, as a consequence, it is far more difficult for researchers to keep in touch with developments in their research area or to locate important work that is potentially relevant to their own investigations.

This problem is underscored by available data. Although AERA paper request patterns are probably more random than request patterns in other fields, it seems reasonable to assume that a substantial proportion of those who request copies of AERA presentations are likely to do so because they seem relevant to their own work. But when requesters of AERA papers that were subsequently published were asked if they knew of the subsequent publication, only 11% of the AERA requesters were able to answer in the affirmative (compared to 46% of the American Sociological Association and 86% for the Optical Society of America).[55] Authors of these subsequently published AERA papers were asked to name other researchers doing research in the same area, and then these other researchers were surveyed to determine if they knew of the publication. Only 39% of these other researchers, actively working in the same research area were aware of the published article.[56]

E. Secondary Publications

Because Primary publication outlets are so diffuse, secondary publications such as indexes, abstracts, and review articles are especially important but highly inadequate in education. No indexing or abstracting service comprehensively covers the field as a whole. There are 19[57] different services relevant to the field of education, at least 12[58] of which are relevant to educational research. Many periodicals of relevance to education and educational research are not covered by these services.[59] Indexes provide little information of help to the researcher in guiding his literature search, and therefore abstracts are highly preferred by researchers, in education as in other fields.[60] But abstracts are available for only specialized topics (e.g., Educational Administration Abstracts) or for the vast collection of fugitive literature stored in the ERIC system (which, as we shall see shortly, has problems of its own).

Given the enormous size of the education literature, the redundancy of the bibliographical tools available for searching the literature, and the lack of abstracting for the great bulk of material in that literature, any attempt to comprehensively and thoroughly search the literature is unlikely. This is especially so if the researcher has little more to guide his efforts than indexes and abstracts, and particularly when the subject labels used to categorize information are only distantly related to the usage that comes to mind when he thinks about his research problem and his information needs for attacking the problem.

As if this situation were not dreary enough, the researcher who painstakingly does try to conduct a thorough literature search finds that most of the literature identified and located with such difficulty turns out ot be of questionable quality or utility. This picture is not unduly exaggerated. It is little wonder, then, that literature search in education tends to be carried out in somewhat casual fashion, and primarily for the purpose of providing a scholarly introduction or framework for the work to be presented. Data show clearly that educational researchers tend to use literature searches less often to shape their thinking in generating or conceptualizing a research problem, or conducting their investigations, and considerably more often to help them present their research formally in written presentations.[61] Information flow in such cases is not so much influencing research as it is influencing the manner in which research is described in the literature.

Where a field provides an adequate system of periodically written syntheses of the literature in each research area, these problems of literature search are minimized. If review articles are comprehensive and detailed enough in their coverage and citation of the literature, the researcher is less dependent on indexes or abstracts adn is more likely to bypass this bibliographical step and go directly from the review article to the journal articles and other sources cited, and probably to build his bibliographical search from citations and other references in these sources. And where review articles are produced under authoritative sponsorship, the reader can be assured that literature of poor quality or limited utility will not be cited, increasing his own efficiency in searching the literatuer for information relevant to his work.

Under AERA sponsorship, the educational research field has made significant strides in generating an extensive and high quality review literature that is widely used in the field. We include here such AERA projects as the <u>Encyclopedia of Educational Research</u>,[62] the first and second editions of the <u>Handbook of Research on Teaching</u>,[63] the quarterly journal <u>Review of Educational Research</u>,[64] and the newest addition, the annual <u>Review of Research in Education</u>,[65] The ERIC system has also contributed to this review literature by producing an extensive number of information analysis products synthesizing the literature on specific topics.[66]

Clearly, more reviews of this kind in other non-research R/D&I specialities (e.g., development or dissemination) would take the field a long way toward accumulating the high quality knowledge and technology bases needed to support these professional specialties.

F. Overview of Information Flow Problems

Given the diffuseness and the unstructured nature of publication outlets in education, the as yet inadequate coverage of the field's increasingly useful system of secondary publications, and the resultant difficulty of keeping up-to-date or locating informatin relevant to one's own work in progress, the weakness of information exchange at AERA meetings takes on added significance. If the researcher does not adequately assimilate information about current work during the AERA meeting, or request copies of papers afterwards, there would appear to be somewhat limited probability that he will later come across the study in print. One third of the presentations never appear in print.[67] And those that are published are scattered among scores of journals -- within one year of one particular AETA meeting, 102 of the papers presented had been published in 64 different journals, and only four of these journals had published more thn two of these manuscripts.[68]

Even if the researcher does later come across the study in print, it is unlikely that he will get the information in time for it to influence his work. Data suggest that it tends to take 2½ to 3½ years after an AERA meeting for even half of the material presented at the meeting to be published.[69] (Now that an effort is being made to gather AERA papers for inclusion in the ERIC microfiche colleciton and its document reproduction service, this problem may be partilaly alleviated. But this assumes that the ERIC system permits easy access to the material stored, a problem we shall return to shortly.)

The question of whether information on current research is available at a time when it can influence other ongoing research returns us again to the primary problem at the root of all information flow weaknesses in education. It is virtually impossible to have up-to-date information on work in progress circulating among researchers in a field without some significant degree of social organization. Data suggest that it takes approximately 34 months from the time a study begins until it appears in print in an education journal, 13 months before we find even informal reporting at colloquia or professional association meetings.[70] Generally, by the time one of his manuscripts is published, a researcher has progressed far enough along on subsequently undertaken research to be ready to disseminate findings informally on the later investigation. If channels are lacking for informal communication, the only finding available to the field at any given time are those that may have already been superseded or made obsolete by subsequent research.

Though the national meeting is a link between formal and informal communcation, there is relatively little flexibility in AERA programming to permit up-to-date information exchanges on work in progress. Paper proposals have to be submitted at least eight months prior to the meeting date, and the research to be reported must already be far enough along by the time the proposal is written that at least tentative findings can be included in the proposal and their significance discussed. Consequently, any findings to be presented eight months later are likely to be out of date by the time of the meeting. More current work is unlikely to get presented because it cannot be described by the time of the proposal submission deadline in a manner that is likely to be acceptable to the proposal readers.

Some small amount of flexibility is provided in sessions set aside for NIE or some other priority group, a few (though not many) of the symposia, or perhaps some (though not much) of the program set aside for the SIGs (Special Interest Groups). But this is pretty far from what we would consider ideal -- e.g., organizing AERA meetings around research areas rather than the current structure of divisions; drastically reducing the amount of program time devoted to presenting unsolicited papers submitted by researchers reporting on-shot studies (e.g., doctoral dissertations that are not part of broader research programs), and allocating substantial blocks of time to commissioned though papers within research areas -- to produce research area syntheses and analyses to stimulate discussion, intensive small or face-to-face exchanges, and delineating research agendas and exchanging ideas about how they might be carried out; and through a variety of means devoting more time to consciously and purposefully stimulating the development and expansion of research areas, developing communication networks, and strengthening social contacts within research areas.

G. Information-Seeking Behaviors

Information-seeking behaviors in educational research tend to be particularly inefficient. In part, this may be attributable to a lack of sophistication in the information-seeking skills of educational researchers. But equally, if not even more important are the problems attributable to the nature of the domain referred to as educational research and the underdeveloped state of research areas and research communities in education.

While fundamental researchers in disciplines relevant to education may be relatively well linked to the research communities of their disciplines, "educational research" as such is a conjunctive domain, i.e., a problem-focused area in which knowledge from a dozen or more disciplines is brought to bear on the solution of a given problem. This is especially serious in applied work, but even in basic research done in the derivative disciplines such as educational sociology, the information to be gathered is rarely restricted within the boundaries of a single discipline or research area.

As we noted earlier, the further the researcher gets from his own specialized research area, the more difficult it is for him to be linked effectively to the informal communication channels of a field in which he is seeking information, and the more dependent he becomes on searching the formal archival literature of the field, the less able he is to cut his way efficiently through the various classification schemes for storing and retrieving knowledge, and the less efficient his information gathering. Clearly, the problem is multiplied several times over when the researcher must gather information from several disciplines or research areas as a basis for a particular investigation. Since the field is not structured in a way that might permit a researcher to quickly identify who to talk to in any given research area to orient him toward the informal communication network of that area, the characteristic pattern in educaitonal research is one of random information-seeking behavior, inadequate quality control, and lack of adequate focus in the investigation that is based on the insights and understandings gained form this inefficient information search.

H. Information Systems and Agencies

The ERIC system was established in the 1960s to bring together the massive fugitive literatuer of the field of education and provide a computerized retrieval system that would provide users with ready access to the available literature on a given subject. The network of specialized clearinghouses and centralized facilities not only acquired, indexed and abstracted, and stored the literature in specific subject areas for future retrieval, but it also published announcements of materials received, reproduced and made available hard or microfiche copy to users who requested specific items, indexed the journal literature using the same classification scheme as that used for the fugitive literature, and produced information analysis products reviewing and synthesizing teh material on selected topics. Most recently, ERIC facilities have been linked to various active, information service capabilities in SEAs, LEAs, and other institutions, providing supports especially to practitioners who need retrieved information synthesized and tailored to their needs if it is going to be used.

However, despite these impressive capabilities and the enormous scale of what the ERIC system has achieved, the ERIC system has been severely criticized, both by its users and those who have given up on the system. The focus of much of the criticism is the system's orientation toward comprehensiveness of coverage rather than selectivity and quality control. As a consequence of these difficulties, users generally face significant problems in attempting to digest the enormous number of abstracts spewed out by the system's computerized retrieval capability, most of which are discarded by the potential user as poor in quality or inappropriate to his needs, or both. Many researchers who make extensive use of the ERIC collection bemoan the time waste resulting from their need to sift the wheat from the chaff, but continue to use the collection because it remains the best source of ready access to the literature. Many others, however, have been overly discouraged by the inefficiency of using the system and either no longer use it or use it as little as possible.

Clearly, the ERIC system is a valuable resource, but one that needs considerable strengthening if it is to be more widely used by educational researchers.

4. Conclusions

Information flow remains one of the serious sources of weakness in educational R/D&I. Despite AERA interest a few years ago in strengthening research communities and developing more effective communication mechanisms analogous to invisible colleges,[71] neither the Association nor NIE has done much to strengthen information flow in the field into more orderly patterns. There has been a vacuum of leadership in this critical area, and in the absence of initiatives to improve information flow among educational researchers, the knowledge base of the field remains weak and fragmentary and R/D&I functioning remains inefficient and relatively ineffective.

FOOTNOTES

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3. Kuhn, The Structure of Scientific Revolutions, op. cit.

4. On the sociology of science, social and communication structures of research areas, and invisible colleges, see: Paul Lazarsfeld, "The Sociology of Empirical Social Research," American Sociological Review, Vol. 27, December 1962, pp. 757-767; B. Barker and W. Hirsch, eds., The Sociology of Science (New York: Free Press, 1962); Gunnar Boalt, The Sociology of Research (Carbondale, Illinois: South Illinois University Press, 1969); Warren O. Hagstrom, The Scientific Community (New York: Basic Books, 1965); Norman Storer, The Social System of Science (New York: Holt, Rinehart, and Winston, 1966); Derek J. de Solla Price, Little Science, Big Science (New York: Columbia University Press, 1963); Derek J. de Solla Price, "Networks of Scientific Papers," Science, Vol. 149, No. 3683, July 30, 1965, pp. 510-515; Jonathan R. Cole, "Patterns of Intellectual Influence in Scientific Research," Sociology of Education, Vol. 43, No. 4, Fall 1970, pp. 377-403; Diana Crane, "The Gatekeepers of Science: Some Factors Affecting the Selection of Articles for Scientific Journals," American Sociologist, Vol. 2, No. 4, November 1967, pp. 195-201; Diana Crane, "Social Structure in a Group of Scientists: A Test of the 'Invisible College' Hypothesis," American Sociological Review, Vol. 34, No. 3, June 1969, pp. 335-352; Diana Crane, "The Nature of Scientific Communication and Influence," International Social Science Journal, Vol. 22, No. 1, 1970, pp. 28-41; Diana Crane, Invisible Colleges: Diffusion of Knowledge in Scientific Communities (Chicago: University of Chicago Press, 1972); Diana Crane, "Information Needs and Uses," in C. A. Cuadra and A. W. Luke, eds., Annual Review of Information Science and Technology, Vol. 6 (Chicago: Encyclopedia Britannica, Inc., 1971), pp. 3-39; Carnot E. Nelson and Donald K. Pollock, eds., Communication Among Scientists and Engineers (Lexington, Massachusetts: Lexington Books, D. C. Heath Inc., 1970); Saad A. Nagi and Ronald G. Corwin, eds., Social Contexts of Research (New York: Wiley, 1972).

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7. Richard Dershimer, "The Colloquium: A Recapitulation," in Richard Dershimer, ed., The Educational Research Community: Its Communication and Social Structure (Washington: American Educational Research Association, 1970), ERIC ED 057 275.

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11. Nelson, Garvey, and Lin, "Scientific Information Exchange Surrounding the 1968 Annual Meeting of the American Educational Research Association," op. cit.; Nelson, "Journal Publication of Material Presented at an Annual AERA Meeting," op. cit.; Carnot E. Nelson, "The Communication Systems Surrounding Archival Journals in Education Research," Educational Researcher, Vol. 1, No. 9, 1972, pp. 13-15; Carnot E. Nelson, Scientific Communication in Educational Research Final Report (Washington: Office of Education, 1972), ERIC ED 073 793; Carnot E. Nelson, Scientific Communication in Educational Research, paper presented at Annual Meeting of the American Educational Research Association, Chicago, April 1972, ERIC ED 063 138; Carnot E. Nelson, "Communication Within the Educational Research and Development Community - Suggested Steps Toward Further Structure and Order," Educational Researcher,

Vol. 2, No. 4, April 1973, pp. 13-14; Carnot E. Nelson and Carol V. W. Adams, "Continuity of Research Effort and Sources of Scientific Information by Educational Researchers," _Educational Researcher_, Vol. 2, No. 6, June 1973, pp. 13-15; Nelson, "Abstract and Information Retrieval Services in Educational Research," _op. cit._; and Carnot E. Nelson, Jackie Greaner, and Robert Hack, "Educational Researchers React to the _Educational Researcher_," _Educational Researcher_, Vol. 4, No. 3, March 1975, pp. 13-15.

12. Richard Dershimer, ed., _The Educational Research Community_, _op. cit._ These papers were prepared for a 1968 colloquium sponsored by the AERA in an effort to "learn how researchers can intervene more effectively in the development and direction of their field." The argument is made that control over the direction of educational research has been in the hands of federal officials at HEW rather than in the field, and that what is needed is field-based planning to provide a greater balance between researchers in the field and HEW bureaucrats in decision making about research priorities, directions, and programs.

As described by Dershimer, AERA's leadership started from three premises in organizing this colloquium: (1) that the communication mechanisms and social structure of the field are inadequate to permit effective field-based planning, (2) that other scholarly fields, especially the hard sciences, might provide models for the field of educational research, and (3) that professional associations such as AERA can actively intervene in the existing social and communication networks in educational research to "reshape the social organization and restructure the communication networks in the field so as to make educational researchers more effective in shaping the substance of their field and influencing relevant aspects of public policy."

In addition to Dershimer's pieces, the volume includes five invited papers: (1) a summary of Ronald Corwin and Maynard Seider's interviews with sociologists of science, considering differences between the field of educational research and other scientific fields and how these differences affect the structure of the field, the quality of educational research, the relationship between basic and applied research, and control over research policy; (2) a preliminary presentation of the data collected by William Garvey and his colleagues at the Johns Hopkins University Center for Research in Scientific Communication on information flow in education from the time a researcher begins working on a project, through presentation of a report on his findings at the annual AERA meeting, to the preparation and publication of articles on the findings in the various journal outlets of the field;

(3) an analysis of invisible colleges and how they function by William J. Paisley; and (4) and (5) analyses, by Norman Storer and Warren Hagstrom suggesting that the nature of education as a problem-oriented rather than a discipline-oriented field and the backgrounds of those who make up the field create barriers to an effective social and communication system in education that are more complex than those faced by the sciences.

The articles in this volume were invaluable for providing an overview of the information flow topic, for suggesting key contextual factors in the educational research community that affect information flow, and for indicating some of the information flow policy and management options that had been actively considered by the leadership of the AERA.

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14. See the Crane references above in footnote 4.

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(Washington: ERIC Clearinghouse on Library and Information Sciences,
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20. Crane, "Information Needs and Uses," op. cit.

21. Ibid.

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23. Ronald Corwin, "Beyond Bureaucracy in Educational Research Management," The Generator (Newsletter of AERA Division G), Vol. 5, No. 2, Winter 1975.

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58. Ibid. Marron and Sullivan list 11 and we have added the CIJE.

59. Prior to the appearance of the CIJE, the Education Index covered more journals than any other indexing service. However, even this source covered only slightly more than half of the 357 journals named by Herner's respondents as regularly read by them to keep up to date in the field. Herner et al., Study of Periodicals and Serials in Education, op. cit.

60. Nelson, "Abstract and Information Retrieval Services in Educational Research," op. cit.

61. Nelson and Adams, "Continuity of Research Effort," op. cit.

62. Robert Ehel, ed., Encyclopedia of Educational Research, 4th Edition (Riverside, N.J.: MacMillan).

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64. In 1969, this journal underwent an important change in editorial policy, so that it is now comprised largely of unsolicited syntheses of the cumulative knowledge base of research areas, often new, emerging research areas.

65. This has been published each year since 1973 for AERA by F. E. Peacock of Itasca, Illinois. The first three volumes were edited by Fred Kerlinger (Vol. II was edited by Fred Kerlinger and John B. Carroll).

66. See the sources cited above in footnote 19.

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639

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER EIGHT

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CHAPTER EIGHT

OUTPUTS

OUTPUTS

Page

Ultimately, any research or R/D&I system will be judged on the quality of the outputs it produces. Currently, the outputs that have been produced by the system have been receiving very mixed reviews. The tone of most of the discussion of output quality that has appeared in the literature is rather negative. The repeated theme is that most of the outputs that have been produced are poor in quality and have had little influence on educational practice: little of the system's enormous research output has been found to affect practice and relatively few of the development outputs that have been produced can be found in large numbers of schools affecting instruction, school organization, administration, etc. At the same time, the system has always produced some outputs of outstanding quality: there are, for instance, a good number of products of widely reputed excellence that have been adopted by large numbers of school systems. And, the field has shown some noticeable progress in establishing itself and gradually evolving the institutional, personnel, and knowledge/technology base needed for longer-term development of the system's capabilities and more high quality outputs in the future.

We have reviewed some of the literature helpful for getting a sense of what the system has produced to date. In this chapter, we will summarize what that literature has to say about educational R/D&I outputs -- what sorts of things have been produced, in what quantities, of what quality, as measured by what criteria. In some instances, the literature does not provide sufficient information on a matter of importance to our analysis. In these cases, we supplement what we have learned from the literature with our own observations based on familiarity with the field. We carefully document the sources of our statements, making clear which points are derived from our own observations, which from the literature.

In addition, we have done some thinking about two kinds of developments we see as needed to improve the quality of outputs produced by the system.

1) One set of needs would seem to be on the macro or system

level of management. Based on what we think we know at this point about the outputs that have been produced to date, what kinds of policy or management initiatives would seem to be needed to improve output quality? And two, what would seem to be the requirements for a useful data base and monitoring system on system outputs, one that could permit system managers to: (a) monitor progress toward the goal of more high quality, widely used outputs, (b) develop policy/management initiatives to improve the quality of system outputs and the system's capacity for producing them efficiently, and (c) evaluate the effectiveness of particular initiatives? We consider both sets of issues.

2) A second set of needs would seem to be on the micro level of management -- i.e., improving project level management strategies. We have started from the assumption that outputs with different KP and KU requirements are likely to have different management requirements. We have therefore proposed a typology of KP-KU requirements that may be useful for structuring the cumulative development of an inventory of management strategies appropriate to different kinds of outputs.

The discussion in this chapter moves from the descriptive material to more speculative sections that may potentially have policy or management implications. Sections I, II, and III deal with the descriptive material: first, some definitional and usage issues (Section I); then, a broad overview of the literature, categorizing the various types of discussions to be found (Section II); and finally, a summary of what can be said at this point in time about the outputs that have been produced -- issues of output types, quantity, and quality (Section III).

We then move on to more speculative discussions -- policy implications (Section IV); data base and monitoring system requirements (Section V); a proposed output typology for inventorying output management strategies (Section VI); and some conclusions about needed conceptual work and research (Section VII).

I. DEFINITIONS, SCOPE OF COVERAGE, USAGE

Most of the literature that discusses the outputs of educational R/D&I focuses on one or both of two categories of outputs:

1) the outputs of inquiry: knowledge, findings, theories, conceptions, paradigms, etc., including (but not restricted to) presentations in print in the form of journal articles, technical reports, papers, books, etc.; and

2) the outputs of development (or R&D): products, programs, practices/procedures, guides, materials, "innovations", etc.

In addition, one source, The Oregon Studies in Educational Research, Development, Diffusion, and Evaluation,[1] describes three other kinds of outputs:

3) an intermediate output: i.e., an outcome of a particular activity undertaken in order to produce the outputs of inquiry and development as listed above -- for instance, progress reports, technical reports, evaluation reports, etc.;[2]

4) an event: defined as "an outcome of work effort that results in the occurrence of an observable transaction or set of behaviors, e.g., a seminar, a staff meeting, a field test";[3]

5) a condition: defined as "an outcome of work effort that creates a desired circumstance expected to endure over the life of a project, or as a result of it, e.g., parental.

involvement in planning school curricula, good staff morale."[4]

The Oregon Studies category scheme was developed in order to permit classification of R/D&I processes and patterns of functioning. As described by the Oregon staff, initially their scheme had focused only on "hard" products, i.e., tangible, concrete, transportable, packaged outcomes. They included the various intermediate outputs and added the two categories of "events" and "conditions" as they became increasingly immersed in the patterns of functioning that characterized the R/D&I projects they studied, the kinds of activities that took up the time of the staff, and the requisite skills and competencies that had not received much attention from the field, in part because outputs had been thought of only in terms of hard end products. A good case could be made for including various kinds of "soft" outputs in an analysis of the educational R/D&I system. There have been large numbers of seminars and conferences. And certainly much has been achieved in the sense of creating various "conditions" -- for instance, acceptance of the idea of rigorous development and continuous data-based refinement in the production of materials, greater understanding of the requirements and complexities of R/D&I functioning in the educational context, creation of new institutions, recruitment of new personnel, etc.

However, for our purposes, to make this analysis manageable, a more "boundable" concept of outputs seems essential. We shall therefore focus our attention on the kinds of outputs that fall within the more widely used definition of R/D&I outputs, i.e., the outputs of inquiry and development or "R&D".

We shall not, though, restrict our attention to only the "harder", tangible, concrete, transportable forms of these outputs. The category scheme we will consider at some length later in this chapter will take account of outputs of inquiry and development that cover the full range from the most amorphous to the most concrete. To illustrate, the range might run from: (a) "research findings" learned by a single researcher and found only in his head, to (b) those research findings presented in a scholarly article and later perhaps in (c) some synthesis of current knowledge in a given research area. Or, for development the range might run from (a) an approach to teaching a given block of subject matter developed by a single teacher and used in her own classroom, to (b) a fully packaged set of materials embodying this approach, for use by other teachers and students, widely disseminated and used in other school systems.

To summarize, as depicted below, the educational R/D&I outputs we will discuss in this chapter will be categorized as either outputs of inquiry or outputs of development. Although the focus of our attention will be on those more concrete output forms generally construed as the outputs of the system (e.g., curriculum products or research articles), we will also consider some of the more amorphous forms of output that could potentially become more concrete, tangible outputs and be made available for wider use.

	amorphous ⟷ concrete
outputs of inquiry	
outputs of development	

II. OVERVIEW OF THE RELEVANT LITERATURE

Our discussion of educational R/D&I outputs draws primarily on three bodies of literature:

1) a <u>descriptive</u> literature useful for gaining some sense of what outputs have been produced;

2) an <u>evaluative</u> literature addressed to the question "How good are these outputs?" as measured by one or another implicit or explicit standard; and

3) a portion of the diffusion research literature that analyzes the <u>characteristics</u> of innovations which seem to be related to rates of adoption and/or use.

1. The Descriptive Literature

Most of the outputs of the system have been produced in print form -- for instance, inquiry outputs in the form of reports, monographs, or journal articles, or technical outputs in the form of curriculum guides or instructional materials. There is, then, a large literature <u>of</u> outputs. However, the output has been enormous in terms of sheer bulk and continues to be produced at a prodigious rate. One could probably spend a lifetime reviewing that literature <u>of</u> outputs and still fail to locate or review them all. For the analyst interested in gaining simply a "sense" of what the system has produced, the available descriptive literature <u>about</u> these outputs is highly useful.

We have seen no single source that attempts to provide any kind of detailed descriptive overview of this massive output -- not surprising given the probably, near-impossible demands of such a task. There are, however, several kinds of sources one might consult to get a good sense of what that output, or portions of that output, look like.

A. Summary Overviews

There are useful summary discussions in the two system status reports produced by OE and NIE -- OE's 1969 publication *Educational Research and Development in the United States*[5] and NIE's *1976 Databook: The Status of Education Research and Development in the United States*.[6] The OE volume does not provide much descriptive material about outputs, but it does include: (a) a taxonomic analysis of R/D&I activities, and (b) a review of assessments of the impact of various kinds of outputs, both helpful for providing a picture of some of the kinds (and substantive foci) of outputs the system has produced. The NIE volume provides a great deal of useful summary data: describing exemplary products and their utilization histories; giving an overview of the NIE-sponsored products described in the 1976 *Catalog of NIE Education Products* (their developers, distribution by subject areas, product formats, kinds of evaluations conducted on these products, etc.); giving an overview of published educational research (the distribution of articles by subject area); and providing some insight into the quantity of research output (numbers of journal outlets, numbers of presentations at specific AERA conventions, numbers of journal articles and amount of report literature).

B. Guides, Catalogues

Many individual R/D&I performer institutions publish catalogues or bibliographies of the various research reports and/or development outputs they have produced.[7] In addition, product guides or catalogues have been published by:

a) groups of R/D&I performer institutions (for instance, the CEDaR Catalog of Selected Educational Research and Development Programs and Products[8] published by the association which represents the interests of the various federally funded labs and centers);

b) individual R/D&I sponsors, to describe what has been produced with their funds (for instance, the Catalog of NIE Education Products[9]);

c) R/D&I contractors, or parts of the federally funded network of institutions given the job of examining, describing and/or evaluating some of the system's outputs (for instance, the Product Development Reports produced by the American Institutes for Research,[10] or the various information analysis products and bibliographies of information analysis products put out by the ERIC system[11]); and

d) various independent organizations working with or without funding from R/D&I sponsors (for instance, guides produced by the Educational Products Information Exchange[12] or A Consumer's Guide to Educational Innovations published by the Council for Basic Education[13]).

C. Review Articles, Handbooks and Annual Reviews, Syntheses, Bibliographies, Indexes and Publications of Abstracts of Research

The literature in this category can provide some sense of the huge number of topics covered by the field of educational research and the types of inquiry outputs that have been produced.

The educational research field has produced (especially in the last few years) a large number of research syntheses in the form of handbooks and annual reviews containing critical reviews and bibliographies of the literature in various research areas. The annual Review of Research in Education[14] produced by the AERA each year since 1973 is especially important here, supplementing such less frequently AERA-produced review sources as the 1963 and 1973 editions of the Handbook of Research on Teaching[15] and the decennial Encyclopedia of Educational Research.[16] Of equal importance is the AERA's quarterly journal Review of Educational Research (especially since it changed its policy in 1969 and now publishes unsolicited review articles on small active research areas).[17] Also useful (if one cares to dig a bit deeper and get closer to primary sources), are the indexes, etc., produced by the various indexing and abstracting services of the field and the related disciplines.[18]

In addition to various areas of fundamental and applied research, the specialties of evaluation research and policy research have become so prolific that annual reviews have appeared for these specialized communities of researchers.[19]

One other source should be noted as well. As part of a broader study of educational research output and quality, Caroline Persell categorized one large segment of the research output of a given year into a number of broad topics and she reports on their distribution.[20] We will draw on this analysis as well in our presentation.

2. The Evaluative Literature

The evaluative literature is of several types:

A. Impressionistic Commentary

The literature includes a rather large number of statements about the quality of educational R/D&I outputs, made in the course of discussions of other generally broader topics. These appear to be made on a largely impressionistic basis, without any documented evidential basis. However, they cannot be dismissed easily as simply impressionistic since they include statements made by several of the experts with widely acknowledged stature and eminence in the field.[21] (Judgments of panels of such experts are the basis of many of the more systematic, empirical investigations of quality of output considered below.)

B. Empirical Investigations of the Quality of Research Output

There is a substantial body of literature on educational research quality that is based on examination of large numbers of publications and/or systematically selected samples. Benjamin Bloom, for instance, based his assessment of the research output of the preceding 25 years on an inventory of 70,000 titles.[22] Other investigations have been based on carefully developed lists of journals publishing educational research, systematic stratification of research articles, and systematic drawing of proportionate random samples of research articles to be reviewed[23] (or in the case of the unpublished report literature, a random sample of documents indexed and abstracted in ERIC's Research in Education for a particular year[24]). Several of these investigations used panels of judges selected for their professional reputations as experts in educational research. One study used a panel of judges drawn from a random sample of the membership of the AERA's Division D (Measurement and Research Methodology).[25] These investigations generally make explicit the criteria used in defining and judging output quality as well and present distributions of ratings made, discussions of weaknesses, etc.

C. Analyses Identifying Significant Bodies of Research and/or Development Outputs

Several interesting pieces in the literature identify and describe various bodies of research judged by the writer(s) -- all people of stature in the field -- to be of outstanding significance.

a) The report of the National Academy of Education's Committee on Educational Research discussed four significant chains of inquiry as illustrative of how disciplined inquiry has had a significant impact on educational thinking and practice.[26]

b) The report of the National Academy of Sciences Committee on Fundamental Research Relevant to Education considered eight research areas in which fundamental research has had (and/or has the potential in the future to have) significant impact on the solution of high priority educational problems.[27]

c) J. W. Getzels noted several paradigms that developed cumulatively from research and had significant impact by changing the general conceptions held by practitioners and indirectly educational practice.[28]

d) In addition, the 1969 OE status report identified four areas of significant research as illustrative of the manner in which bodies of educational research had been applied in educational development and could also potentially affect educational policy.[29]

e) Earlier, Daniel Griffiths and a panel of knowledgeable researchers and educational administrators identified what they judged to be the ten most significant educational research findings of the previous ten years. (This article was published originally in 1967.)[30]

D. Analyses Identifying Exemplary Products, Programs, or Practices

The literature includes many references to a few of the early outstanding system outputs. Widely cited as illustrative of what the system might be capable of producing some day on a wider scale are the National Science Foundation Course Content Improvement Program, Individually Prescribed Instruction, and Sesame Street.

In addition to these references to outstanding outputs, several efforts have been made to identify, describe, and (in some cases) facilitate the dissemination of some of these products or programs.

For instance, the identification, validating (in some cases), and packaging of "exemplary practices" has become one of the increasingly prominent activities of State Departments of Education, especially those receiving federal funding to expand their R/D&I capabilities.[31] A body of literature has begun to accumulate about these practices and efforts to disseminate them.[32]

In addition, two projects have sought to identify "exemplary products." Both have produced information about these products including information about the extent of their adoption and use in school systems.[33]

E. Studies of the Extent of Adoption and Use of Development Outputs

In addition to the sources categorized above which focus on specific selected outputs,[34] the literature includes reports of the findings of surveys which have been made of the extent of adoption and/or use of various categories of innovations.[35] These surveys are useful, both for noting the kinds of innovations identified and for arriving at judgments of output quality (with widespread adoption of an innovation used as an indicator of quality).

F. Evaluation Research on Specific Outputs or Bodies of Outputs

Many of the development products available for use, especially those produced by systematic R&D, have been formally evaluated and evaluation reports are available for examination by researchers, policy makers, or potential adopters. For instance, of the 776 products on which data was collected for the Catalog of NIE Education Products, NIE was able to secure evaluation data on 498 (64%). For these 498, the following kinds of evaluation research had been completed:[36]

- small-scale controlled tests of effectiveness	63%
- small-scale field tests of practicability, transportability, or replicability	78%
- large-scale replications	42%
- follow-up studies of impact	13%
- marketing or feasibility studies	36%

Many of these evaluation reports are available in the files of R/D&I sponsors as well as the performer organizations. Some are available through the ERIC system.

3. Output Characteristics as Analyzed in the Diffusion Research Literature

There is a very large diffusion research literature which we draw on for several chapters of this analysis.[37] In this chapter, we will maki use of analyses from that literature which identify specific characteristics of innovative outputs which seem to affect their likelihood of being adopted.[38] We will considar these (and other) output characteristics in terms of their policy and management implications for improving the effectiveness of outputs produced by the educational R/D&I system.

4. Overview of What Is To Be Found and What is Lacking in the Literature

The available literature relevant to answering questions about educational R/D&I outputs is large. However, as we shall see shortly, it does not present a complete picture of what the system has produced. Each source tends to deal with only only a small portion of the total output. The literature is least useful in providing an overall sense of what kinds of outputs have been produced, in what quantitias. At best, an analyst can try to pieca together such an overall picture. At this point in time, different analysts would probably present rather different categorizations of the system's outputs, and probably even bound off somewhat differently what is and is not definad as an educational R/D&I output. Efforts to develop a useful monitoring system would be somewhat simplified if the field could arrive at greater consensus on these questions.

The literature is most helpful, and most consistent, on questions of output quality. But even here, there would seem to be inadequate elaboration of many of the criteria and standards used in judging quality, an issue of some consequence for identifying indicators to be monitored.

Before speculating about some of the policy implications and monitoring requirements suggested by current thinking and the present state of knowledge about educational outputs, let us summarize what can be said about these outputs at this point in time.

III. OUTPUTS PRODUCED TO DATE

At least three questions need to be considered as a basis for thinking about the system's outputs to date:

1) What has been produced?

2) In what quantities?

3) Of what quality as measured by what criteria or standards?

We consider each of these questions in turn.

1. What Has Been Produced?

Within the definition of outputs provided earlier, we have attempted to enumerate and order the categories (and sub-categories) of output forms discussed in the literature and/or familiar to us from our experiences and observations. As noted earlier, other analysts would probably arrive at some other listing, adding some sub-categories differently. The intent here has not been to be totally comprehensive so much as to be sufficiently comprehensive to illustrate the range and diversity of outputs produced - for it is this range and diversity that complicate the problems of macro-level system management and policy development.

We are concerned here with only output forms. Any attempt to categorize the substantive foci of educational R/D&I outputs would likely multiply the complexity by a near infinite degree. To illustrate this, we have reproduced from the literature three category schemes developed to classify different portions of the universe of R/D&I outputs. Table 8.1 summarizes the taxonomy developed by OE's Bureau of Research in the late '60s to analyze how OE allocations were distributed across research functions, curriculum fields, target groups, etc.[39] Table 8.2 comes from a study

TABLE 8.1

USOE TAXONOMY OF EDUCATIONAL R&D ACTIVITIES

1. Research Functions Supported

   Research
   Development
   Evaluation and achievement studies
   Demonstrations
   ERIC
   Other dissemination
   Research training
   Facilities and equipment

2. Topical Area of Study

   Not applicable
   Educational trends, needs and objectives
   The school as an institution
   Educational personnel
   Instructional systems and practices, not further specified
   Facilities and guidance
   Curriculum
   Computer managed or assisted instruction
   ETV, ITV, telelecture
   Social influences
   Individual development and learning processes, human
   Individual development and learning processes, animal
   Information sciences
   Combination of above categories

3. Age-Grade Level of Target Group

   Not applicable or identifiable
   Early childhood (0-6)
   Elemenatry
   Intermediate or middle school
   Junior high school
   Senior high school
   Elementary and secondary combined
   Postsecondary
   Undergraduate
   Graduate
   Adult
   Articulation between levels

4. Special Characteristics of Target Group

Not applicable or identifiable
Intellectually gifted
Physically handicapped (vision, speech, hearing, crippled, etc.)
Culturally deprived, socioeconomically disadvantaged, etc.
Intellectually handicapped (retarded, brain damaged, not further specified, etc.
Emotionally disturbed
Foreign language speakers
Other

5. Demographic Area of Intended Impact

Not applicable or identifiable
Urban, not further specified
Central city
Suburban
Rural

6. Curriculum Subject Matter Fields

Not applicable

Basic Knowledge and Skills
More than one field
Language arts
Foreign languages
Mathematics
Science
Social studies
Other

Academic Skills
More than one field
The arts
Languages
Humanities
Mathematics
Natural sciences
Social and behavioral sciences
Other

Occupational Specialized
Agriculture
Business and office
Distributive
Health
Social services
Recreational services
Technical services
Architecture, engineering, etc.
Home economics

6. Curriculum Subject Matter Fields (continued)

Education Professions

- Curriculum areas not further specified
- Ed. Psychology
- Ed. Sociology
- Ed. Administration
- Curriculum and Instruction
- Guidance and Counseling
- History of Education
- Philosophy of Education
- Learning Theory
- Other curriculm areas

From OE, Educational Research and Devlopment in the United States, op. cit., pp. 125-137.

TABLE 8.2

SUBJECT AREAS OF 1,110 RESEARCH ARTICLES: 1969

Subject Area	Percent of Total
Psychological processes	19
Curriculum	18
Higher education	12
[illegible]	11
Guidance and counseling	10
Research methods	9
Social foundations	8
Reading	5
Special education	3
Administration	2
Speech	2
Other	1

Source: C. Persell, *The Quality of Research on Education* (New York: Columbia University Bureau of Applied Social Research, 1971).

of research articles published in 113 journals in 1969 or presented at the AERA convention that year.[40] Table 8.3 comes from an examination of ERIC accessioning of research reports and other documents from 1956 through 1973.[41] Clearly, the substantive foci of educational R/D&I outputs cover an enormous range.

The category scheme depicted in Figure 8.1 is built around four key dimensions: the type of R/D&I activity that produced the output; the target audience for the output; its degree of concreteness; and its comprehensiveness/complexity.

Type of R/D&I Activity: The outputs we focus on are those produced as a result of either systematic inquiry (basic research, applied research, or evaluation) or development work (systematic R&D, practice-based R&D, or the mixed mode). Although clearly other R/D&I functions such as need identification or dissemination or implementation/utilization support have effects and outcomes of various kinds, these are generally in the form of events or conditions created rather than tangible products or descriptions of findings. We made this point earlier in the chapter. Although in the long run, the effect of new and improved "conditions" may have more consequence for the R/D&I system than, let us say, a research article, we cannot include these less tangible outcomes and still deal with the subject in a manageable way. We do, however, try to consider some kinds of amorphous forms of output in our scheme, and we shall get to this point shortly.

Target Audience: Our category scheme focuses on two target audiences for R/D&I outputs: operating system personnel, on the one hand, and R/D&I system personnel, on the other. There are, of course, other potential audiences as well - Congress, public interest groups, etc. - and often outputs are prepared particularly for these other groups. However, almost all of the outputs we need to consider are targetted at either operating system personnel or R/D&I system personnel, and therefore, these are the two audiences with which we are concerned.

Outputs of Inquiry	Outputs Targetted at Research/R/D&I Community	A1	A2	A3	A4	$A5_1$ $A5_2$	$A6_1$ $A6_2$	$A7_1$ $A7_2$	$A8_1$ $A8_2$
	Outputs Targetted at Practitioners	B1	B2	B3	B4	B5	B6		
Development Outputs	Outputs Targetted at Practitioners	C1 D1 E1 F1	C2 D2 E2 F2	C3 D3 E3 F3	C4 D4 E4 F4	C5 D5 E5 F5	C6 D6 E6 F6	C7 D7	C8
	Outputs Targetted at R/D&I Community	G1	G2	G3	G4				

Figure 8.1

Cagegories of R&D Output Forms

Key to Figure 8.1: R&D Output Categories

I. OUTPUTS OF INQUIRY

A. Outputs Targetted at Research Community and R/D&I System

A1 = Methodological insights about research approaches that are not effective for certain kinds of research questions, and why; process learning about research strategies (i.e., what the first-rate researcher carries around in his head but does not prepare in a form that permits dissemination to others).

A2 = Substantive hunches on inquiry questions (or potential inquiry questions)

A3 = Research findings learned by researcher(s) but not published or disseminated in any form

A4 = Report of findings of individual piece of research (in paper, article, technical report, etc.)

A5 = Report of findings of individual piece of research, with review of relevant literature

- $A5_1$ = atheoretical
- $A5_2$ = theoretically oriented

A6 = Report of findings of series of related research inquiries, with review of relevant research

- $A6_1$ = atheoretical
- $A6_2$ = theoretically oriented

A7 = Knowledge synthesis on a research area

- $A7_1$ = atheoretical
- $A7_2$ = theoretically oriented

A8 = Knowledge synthesis on a research area that critiques a substantive research area or methodological approach, pointing to weaknesses, gaps, and needed work

- $A8_1$ = atheoretical
- $A8_2$ = theoretically oriented

B. Outputs Targetted at Practitioners

B1 = Insights about areas of practice (instructional strategies, approaches, teacher behaviors, etc.) that are or are not effective under certain conditions, and why, teaching competencies and skills (i.e., what the first rate teacher or administrator carries around in his head but does not prepare in a form that permits dissemination to others.

B2 = Hunches about the applicability of a single hypothesis, research finding, or body of research to practice issues, but not prepared in a form that permits dissemination to others

B3 = Report of individual study, written for practitioners

B4 = Report of series of studies, written for practitioners

B5 = Knowledge synthesis on research area, written for practitioners

B6 = Knowledge synthesis on specific practice-derived issue

II. DEVELOPMENT OUTPUTS

C, D, E, F. Outputs Targetted at Practitioners

C = Instructional materials. The range here might be represented by, on the one hand, a single teacher using her own materials for a single lesson, to, on the other hand, a fully packaged set of materials for a subject (or set of subjects) covering grades K-12. Illustrative of the gradations of concreteness is the following:

C1 = A single teacher's ideas for a single lesson, used in her classroom but not committed to print or other media.

C2 = A lesson plan for a single lesson

C3 = An outline or guide for a curriculum unit

C4 = A curriculum guide for a single subject for an entire grade level

$C4_1$ = A curriculum guide for a single subject for grades K-12

$C4_2$ = A curriculum guide for all subjects for grades K-12

C5 = A curriculum guide with lesson plans and other teacher supports

C6 = C5 with the addition of student texts and/or workbooks and/or sourcebooks of instructional materials for reproduction on mimeo or ditto machines

C7 = C6 with the addition of tests and other assessment supports

C8 = C6 or C7 with the addition of audio-visual and/or multimedia materials and/or other resource materials (exhibits, demonstrations, specimens, etc.)

D = "Idea innovations" or "exemplary practices or programs" which may be made available to others in a range of forms varying in concreteness/comprehensiveness. Examples of "idea innovations" include: open education, schools within a school, alternative education, team teaching or cluster teaching, use of paraprofessionals or aides; individualized instruction, independent study, directed study, or continuous progress; ungraded school organization; courses without grades; media centers, resource centers, or instructional materials centers; peer tutoring; toy libraries and other materials lending arrangements; or simulation and gaming. (For examples of exemplary practices or programs, see subsequent discussion in this chapter.) Illustrative of the gradations of concreteness here is the following:

D1 = Idea innovations, practices, or programs used in a setting but not described in print or through use of other media.

D2 = Idea innovations, practices, or programs described in brief summary statements to meet funding requirements.

D3 = Idea innovations, practices, or programs described in evaluations or other technical reports

D4 = Idea innovations, practices, or programs described especially for dissemination purposes in published articles

D5 = Idea innovations, practices, or programs presented especially for dissemination purposes in film, videotape, or other media or multimedia forms.

D6 = Packaging or idea innovations, practices, or programs for dissemination, with descriptive presentations, materials for instructional and/or administrative use, etc.

D7 = Extensive packaging of idea innovations, practices, or programs, with how-to-do-it information and other implementation supports as well as D6 packaging

E = Instructional technology, technology for school management, or innovations in facilities. Included under instructional technology are such hardware and related software items as CAI (computer assisted instruction), the Talking Typewriter and similar types of teaching machines, computers and data processing equipment, audio and videotape technology, films, and television (open and closed circuit). Included under technology for school management would be the software and possibly also the hardware (or use of hardware through a service bureau) associated with scheduling innovations described as: variable modular scheduling, flexible scheduling and back-to-back scheduling; also education management information systems, education planning systems, and education needs assessment systems. Examples of facilities innovations would be the pod type of school design and the movable partitions associated with open education. Illustrative of the gradations of concreteness/comprehensiveness here is the following:

E1 = Supplementary technology for use in a single lesson or brief unit (e.g.: film, videotape, etc.)

E2 = Supplementary hardware for use in addition to standard curriculum in a subject (e.g.: Talking Typewriter)

E3 = Hardware/software so fundamental to instructional strategies that it requires new teaching strategies and curriculum redesign (e.g.: language laboratories, pod-type school design)

E4 = E3 type of output packaged with materials and instructional supports (e.g.: computer assisted instruction packages)

E5 = E4 type of output covering more than one grade level and/or more than one subject area (e.g.: IPI)

E6 = Technology for school management affecting school-wide and/or district-wide policies, approaches, etc. (e.g.: management information systems, planning systems, assessment systems, etc)

F = <u>Miscellaneous Outputs</u>. Examples of other kinds of outputs that might be targetted at practitioners might training programs or new kinds or packages of tests measures. In either case, the range of gradations in concreteness would represent increased coverage from: single lessons to units to courses, to multi-grade levels, etc.; and increased comprehensiveness in packaging from descriptions to models, to inclusion of sample measures, to supports of various kinds (how-to-do-it guides, etc.)

G = <u>Outputs Targetted at R/D&I Community</u>. Included here might be various kinds of organizational or inter-organizational arrangements or networks developed to support R/D&I functioning; how-to-do-it types of materials (for instance, based on documentation and analysis of technical assistance strategies or systematic R&D or some other functional or sub-functional specialty developed systematically into materials for use by others); training programs; data systems or planning models; etc. Illustrative of the possible gradations in concreteness/comprehensiveness of these outputs is the following:

G1 = Idea for such an output described briefly in print.

G2 = Model for such an output developed systematically and described in detail in technical report.

G3 = G2 type of output developed along with supporting materials to permit implementation by others

G4 = Packaging of G3 type of output along with implementation guides, multimedia materials, plus lists of contacts for observation of output implemented at various sites, for exchanges of information among users and also between users and developers and/or for technical assistance to support implementation.

TABLE 8.3

[illegible] ERIC, 1956-73*

[illegible] Instructional materials (4,702), Curriculum development (3,266), [illegible] (1,697) Audiovisual aids (1,3[illegible]), Resource materials (1,135), Behavioral [illegible]

[illegible] AND TEACHING Teacher education (3,7[illegible]), [illegible] (2,6[illegible]) [illegible] (2,621) [illegible] (1,6[illegible]), Teacher [illegible] (1,572) [illegible] (1,122)

STUDENTS, [illegible] CHARACTERISTICS, AND LEARNING Disadvantaged youth (2,617), Academic achievement (2,2[illegible]), [illegible] (1,7[illegible]), ~~[illegible] (1,517)~~, Elementary school students (1,278) Self-concept (1,2[illegible]) [illegible] (1,212) Culturally disadvantaged (1,106), Preschool children (1,0[illegible]6) Learning [illegible] (1,0[illegible]8) Language development (1,014)

SUBJECT [illegible] OF INSTRUCTION Vocational education (2,937), Language instruction (2,679), English instruction (1,[illegible]), [illegible] (1,226), Second language learning (1,191), English as a second language (1,[illegible]), [illegible] (1,057), Grammar (1,036), Modern languages (1,024)

[illegible] Higher education (2,1[illegible]), Junior colleges (2,51[illegible]), Secondary education (1,836), Adult education (1,[illegible]), [illegible] (1,145), State [illegible] (1,075), Elementary grades (1,67[illegible]), Secondary schools (1,[illegible])

[illegible] (2,449), Educational programs (2,010), Educational [illegible] (1,75[illegible]) [illegible] Educational planning (1,539), Federal programs (1,516) Program [illegible] (1,4[illegible]3) [illegible] (1,2[illegible]), Educational change (1,193), State programs (1,173) Decision making (1,119)

[illegible] Educational finance (1,501), [illegible] (1,275), Federal aid (1,017)

RESEARCH, [illegible], AND EVALUATION Program evaluation (3,167), Educational research (2,5[illegible]), Research (2,2[illegible]), [illegible] (2,0[illegible]), [illegible] (1,[illegible]), Comparative analysis (1,722), Surveys (1,523), Data [illegible] (1,352), [illegible] (1,[illegible]76), Statistical [illegible] (1,179), Research methodology (1,167), Testing (1,139) Evaluation [illegible] (2,[illegible]), [illegible] (2,034)

[illegible] ERIC [illegible] 265,000 [illegible] from 1956 to 1965 [illegible] [illegible]

NOTE [illegible] number of ERIC [illegible] this topic. [illegible]

Source [illegible] Report (New York: CCM [illegible], 1975).

Generally, outputs of inquiry or development work are prepared somewhat differently depending on which of these two audiences they are intended to reach. Articles written for research journals, for instance, are likely to describe a research study and its findings differently from articles covering the same material but written for the magazines read primarily by practitioners. Development outputs prepared for use by R/D&I system personnel are sometimes no different in form from analogous outputs prepared for operating system personnel (e.g., training programs). But occasionally, they do differ, with considerably more explicit attention to R/D&I system issues and systemic requirements in these outputs designed for R/D&I personnel. We shall argue later in this chapter for more such system-oriented outputs.

Degree of Concreteness: R/D&I outputs differ in the extent to which they have been packaged in concrete forms which can be passed on to others and used by them. Most conceptualizations include within the definition of "outputs" only those forms of information, programs, etc. that have been packaged in concrete forms (in print and/or through use of some other media). Some other definitions also include such categories of outputs as "exemplary practices" despite the fact that many (probably most) such practices have not been packaged but exist only in demonstration sites (generally, the schools where they were developed) where they can be observed.

Our category scheme includes not only concrete, packaged products and observable but unpackaged practices but also outcomes of R/D&I that are even less concrete in that they may exist only in the heads of those who have carried out particular R/D&I activities - e.g., research findings arrived at by a researcher but not (as yet) described in print; teaching techniques developed by a teacher (or a team of teachers) but not (as yet) captured in a form (a videotape, for instance) that could be disseminated to others; or R&D procedures used by a highly successful development organization but not (as yet) described in a way that could make this valuable knowledge accessible to the rest of the R&D community. Although it would probably be more correct to refer to those as "potential" outputs, we include them here in our category scheme, and will argue later for policies that facilitate the translation of more of these amorphous "potential" outputs into more conrete forms.

Degree of Comprehensiveness/Complexity: Outputs also differ along a continuum of comprehensiveness/complexity. "Comprehensiveness" is a term we find more appropriate for outputs of inquiry. We use it to try to denote the range of forms from, let us say: (a) a report of a single research finding in a paper or an article in a scholarly journal; to (b) a review of relevant literature that synthesizes all the previously published research relevant to the framing of a particular new research question and/or the design of a particular new study; to (c) a review article, bibliographical essay, or "state of the art" paper synthesizing and critiquing all the current knowledge in a given research area. The particular inquiry output presumably becomes more meaningful to (and usable by) the field the more complexly and comprehensively it is packaged along with other relevant research findings and theoretical constructs that need to be understood to make effective and valid use of the new information.

In the case of development outputs, both comprehensiveness and complexity seem appropriate concepts to focus attention on the range of items included in a particular output. These outputs might range in form from, for instance: (a) a lesson plan for teaching a single lesson; to (b) a curriculum guide for a whole new course; to (c) a curriculum guide for teachers along with student workbooks and other printed learning materials; to (d) package c with the addition of multi-media supplementary materials and perhaps too a comprehensive training program for teachers; to (e) d-type package but for a K-12 reading program; to (f) a d-type package for K-12 for all subject matter areas; to (g) an f-type package with additional guidelines and plans for reorganizing the school, with administrative supports, accompanying management information systems, measurement instruments, etc.

Figure 8.1 represents a first cut at the kind of category scheme we have in mind. The top half of the figure shows the range of inquiry outputs we have considered, both those targetted at researchers and other R/D&I system personnel, on the one hand, and those targetted at operating system personnel, on the other. The bottom half of the figure depicts the range of development outputs, again targetted at both groups. In a very rough way, we attempted to place entries in the figure from left to right to indicate increasing concreteness and comprehensiveness/complexity.

Several points we have tried to show in Figure 8.1 need to be underscored before we proceed further. One is the enormous number of types or outputs forms produced by educational R&D, which greatly complicates any efforts that might be made to develop inventories of outputs, or to consider developing standards or criteria for assessing the quality of outputs, or to undertake an actual quality control sifting through the existing outputs to separate the strong from the weak, the valid from the invalid approaches, etc. Each type of output form needs to be understood in terms of its own requirements and its own use patterns, and therefore a huge number of types means a standard setting and quality assessment task of gargantuan proportions.

Second, the ranging of types along the amorphous/concrete and simple/comprehensive dimensions has to be approached carefully to avoid arriving at erroneous policy implications. There has been a tendency in the educational R/D&I enterprise to equate greater concreteness and comprehensiveness/complexity with "better". Up to a point, we would not quarrel with this. For instance, unquestionably, new knowledge that is generated and new techniques that are developed are "better" (from the perspective of advancing the state of development of a given research area) when they are described in print (or through some other medium) rather than simply being stored away in the heads of those who generated the new knowledge. They become accessible for the rest of the field to use, and, equally important, to critique. Only when other knowledge is brought to bear on these findings, and questions about their validity are raised and assessed, can we be reasonably certain of the soundness of this new knowledge. And clearly, a research finding becomes more useful the more it is presented in a way that relates it to the existing knowledge base in an area and shows how it adds to that knowledge base, suggests what previously developed information it calls into question, what new questions it raises, and perhaps too what application implications may be hinted at when it is related to other information already known, etc. Therefore, the more concretely an amorphous, "potential" research output is presented, and the more comprehensively it is treated in the presentation, the "better" (i.e., the more usable the new information) for the field.

However, this is not necessarily equally true for development outputs. There can be no question that in the case of development techniques everything we have said above would hold true - the more fully they are described for the rest of the field, the more accessible they are for review and criticism, and the more they are related to existing techniques in use (and knowledge about them), the better for the field. However, in the case of development outputs, some of the more amorphous and simpler outputs may in fact be more usable (and more widely used) than the highly concrete and complex products. Part of the reason for this is related to costs: the more concrete and especially the more complex and comprehensive an output, the more expensive it is likely to be to produce, to purchase, and perhaps, too, to use. A set of supplementary materials is likely to be far less expensive, for instance, than a multi-media K-12 instructional program, and the more complex products, therefore, are likely to be simply out of reach for the budgets of most school systems. In addition to costs, the increasing complexity and comprehensiveness of a product makes implementation more difficult, either because it may require a great deal of unlearning and relearning by practitioners and/or because it requires a great deal more change of existing procedures, organizational structures, staffing, etc. The more change required, the more difficult it is likely to be to get the product adopted, and (if adopted) implemented effectively.

These factors need to be taken into account when recommendations are made that call for increasing concreteness and complexity in product development. While packaging exemplary practices and programs in more concrete and more comprehensive forms (with teaching guides, learning materials, etc.) may be called for if practice-based development is to have substantial impact outside the sites where the work originated, the greater the costs of the packaging and the greater the complexity of the packaging, the more resistance it is likely to encounter, and this must be understood if we are to arrive at a more workable balance among requirements.

Finally, we need to point to the imbalance of outputs targetted at the different audiences of interest to us. Most inquiry outputs are targetted at researchers directed to devising more effective modes of presenting this information for consumption and use by practitioners. In the case of development outputs, the imbalance is in the other direction. Most of these are targetted at the operating system, which is no doubt, as it should be. However, if the state of the art of R/D&I functioning in education is to develop further, and if the system is to progress to more mature patterns of functioning, more attention will need to be focused on: elaborating R/D&I processes (through state of the art papers, guides, process analyses, etc.) so as to strengthen the field's technology base; structuring existing knowledge and technology into training programs; developing and making extensive use of communication mechanisms for information flow in the field; etc. We shall return to these points later.

Having now considered what kinds of outputs the system has produced, we now turn to the questions: in what quantity? of what quality? as measured by what criteria or standards?

2. Quantities of Output: How Much Has Been Produced?

There is no valid way to answer the quantity question except to say that whatever the precise number it will be enormous enough to be mind boggling. A few indicators should suffice to make the point.

Table 8.5 reproduced from NIE's 1976 Databook is useful for illustrating the large quantity of educational research literature produced in recent years. As shown here, the Current Index to Journals in Education, which began publication in 1969, indexed a total of 102,000 journal articles published during the six year period 1969-1974, an average annual output of 17,000 journal articles per year. Research in Education, the ERIC publication which began publication in 1967 and provides abstracts of accessions generally from the unpublished document/report literature of the field, provided information on a total of nearly 85,000 documents over the eight-year period between 1967 and 1974, an average of more than 10,500 reports produced per year. Of course, there is no way to equate numbers of reports and journal articles to amount of new "knowledge" gained by the field or significant achievements made in understanding or problem solution. The relationship between amount of research performed and amount of new knowledge gained is always a tenuous one, even more tenuous than the weak (and often inverse) relationship between quantity and quality. But clearly, a great deal of research output has been reported on in print.

Since development outputs have not generally been indexed in the manner that research outputs have, it is even more difficult to get any sense of the number of products, programs, etc. that have been developed, even when we restrict our attention to only those that have been developed in packaged product form (thereby excluding educational materials, practices, approaches, programs, etc. that have not been packaged for dissemination and use elsewhere). One indicator, though,

TABLE 8.5

Journal articles cited in Current Index to Journals in Education and documents cited in* [illegible]

Year	Cumulative total report literature	Cumulative total journal articles
1967	2,300	...
1968	11,100	...
1969	21,600	11,700
1970	32,100	27,600
1971	44,100	45,300
1972	56,000	62,600
1973	70,500	82,200
1974	83,900	102,000

**Current Index to Journals in Education* began publication in 1969

Source: NIE

that can provide a sense of the number of development outputs that have been produced is the number of products described in a source such as the Catalog of NIE Education Products.[42] This catalog provides information about development products of R/D&I contractors or grantees currently or formerly receiving NIE funding. The catalog includes tabular presentations of data on 776 products identified in this 1975 survey -- curriculum materials, training materials, handbooks and manuals, tests and measurement instruments, and models. To put that figure in perspective, it should be recalled that NIE provides at most 16% of total federal funding for educational R/D&I,[43] and that in addition to R/D&I in the strict sense that it is carried on with private sector or operating system funds a great deal of more conventional (what we have called elsewhere "practice-based" or "practice-related"[44]) development work is carried on without federal funding. The total development output, then, is enormous. Even within any strictly defined problem or subject matter area, the full array of output available for use is likely to be prodigious.

3. Quality of Outputs Produced to Date

The assessments that have been made of the quality of educational research or R&D outputs tend to fall into one or another of two categories: either (a) discussions suggesting that the bulk of what has been produced is quite poor in quality and/or of little significance, or (b) others that identify a relatively small number of outputs of outstanding quality and influence. Let us consider first the literature assessing the quality of educational research, then evaluations of available development outputs.

A. Educational Research

a. Research Output as a Whole

i. Assessments of Generally Mediocre Quality of the Output as a Whole

Negative assessments of educational research are quite numerous.[45] The terms and phrases that have been used include "mediocre," "less than mediocre," "inadequate," "incompetent," "invalid," "trivial," "weak," "poor," and "of modest significance and quality." Illustrative of the kind of criticism that has been made are the following excerpts from the report of the National Academy of Education's Committee on Educational Research:

> Not all that has passed for educational research has been disciplined to this degree. Investigators rarely control the instructional methods or administrative procedures about which conclusions are drawn sufficiently for the findings to be reproduced by others. Investigators not infrequently frame studies to advance evidence favorable to a conclusion or innovation in which the investigator believes, rather than testing the proposal against reasonable alternatives. The final report is sometimes little more than an essay expressing beliefs held before the study began, embellished rather than supported by the study itself. Even the paraphernalia of statistical analysis may be used to support preconceptions. For example, a writer may emphasize that some experimental procedure produced a "statistically significant" difference and thereby confirmed his working hypothesis, whereas another writer who doubts the hypothesis could as easily stress the small magnitude of the difference and question whether the hypothesis has any important explanatory power.[46]

> We believe that not more than one-tenth of the doctoral dissertations in Education and not more than one-tenth of the work published in the less-well-edited journals, even today, are respectable works of serious inquiry. The

> rest have had their function as training exercises and as tokens required for professional stature, but they have degraded the term 'contribution to knowledge.' Moreover, because the profession has not scrutinized new work and combined it into successively better-informed syntheses, most of the publications have made no conceptual contribution.[47]

Note that the National Academy's estimate of the proportion of educational research that could be considered "respectable" was 1 out of 10. Michael Scriven's estimate, for a large chunk of the research output, was 1 out of 20. Writing in 1960, he stated that ". . . by minimum acceptable research standards, 95 percent of the work (on education) . . . that is concerned with causal analysis is, by either theoretical or practical standards, invalid or trivial."[48] After having examined an inventory of 70,000 titles produced over the previous 25 years, Benjamin Bloom concluded that at most 70 of these titles -- 1 out of 1,000 -- could be considered to have had significant influence.[49]

The proportions given favorable ratings in the various systematic empirical investigations of research quality reported in the literature are not quite as bad as these judgments made by some of the outstanding leaders of the field. Still, the ratings reported can provide little comfort to the educational research community. For instance, judges reviewing a random sample of educational research articles published in 1962 would have rejected 40% of these articles;[50] in a replication study done for research articles published in 1971, the judges indicated that they would have totally rejected 27% of these articles and would have published only 9% "as is."[51] In a study of research published in 1967-68, 43% of the articles were rated below average or incompetent with respect to one or (generally) more of the following: use of proper research methods, contribution to theory, or contribution to practice.[52] The picture is even more dismal when one examines ratings of the unpublished report literature available through the ERIC system: in a study of a random sample of 1971 entries in Research in Education, a panel of research specialists rated approximately two-thirds as mediocre, poor, or completely incompetent and similarly negative assessments were provided for nearly half the entries by a panel of educational decision makers who were not research specialists.[53]

Clearly, whether one examines the report literature or articles published in educational journals, the overall assessment seems to be that the quality of educational research is quite poor. It would be useful to have comparable analyses of more recent research output. Still, there seems to be little reason to believe that the general picture has changed substantially.

ii. Criteria for Judging Research Quality

Several indicators have been used to measure the quality of individual pieces of scientific research. Caroline Persell reviewed a number of these: citation rates (i.e., the frequency with which particular articles are cited by others);[54] research productivity; prize winning; peer evaluations; ratings made by use of evaluation forms; self-evaluations; and characteristics of journals publishing a given paper.[55]

Persell concluded her review by noting that no matter what indicator one tries to use and even after considerable effort is put into developing objective instruments, research quality inevitably must be defined by judgments of people in the field. There is no "intrinsic characteristic of quality which can be recognized by an objective instrument like a geiger counter . . . (and) even when standards are made explicit, their application requires judgments by people."[56]

It is indicative of the state of development of the field that there seems to be:

a) general agreement among research specialists about the kinds of criteria to be used in judging research quality (e.g., "appropriate research design");

b) less agreement about the application of a criterion to judging a particular piece of research (e.g., Was the appropriate research design used in this particular study?);

c) more agreement in judging a particular piece of research if the judges are specialists in the substantive research area rather than specialists in research methodology); and

d) even less agreement if the judges include both research specialists and practitioners who are not research specialists.[57]

An enormous number of instruments have been developed for evaluation of the quality of research outputs. In 1969, one analyst identified 48 different forms available for this purpose.[58] A large literature of checklists or guidelines has been published for use by researchers or practitioners to help them sift through available research and separate competent from incompetent work.[59] Other evaluation checklists have been developed by researchers who have empirically investigated educational research quality.[60]

Generally, these forms elaborate (in more or less detail) on several criteria involving either: (1) the methodology used in carrying out the research (and/or the manner in which the research is reported), or (2) the significance of the research. Illustrative of the kinds of criteria used in these forms is the listing in Table 8.6.

The greater degree of detail illustrated here under the headings of Methodology/Presentation and Significance is typical of the amount of elaboration provided in the evaluation forms. In one case, for instance, significance of the problem area is 1 out of 25 items on a checklist heavily weighted toward research methodology and style of presentation.[61]

Table 8.6

Criteria Used in Judging the Quality

of Educational Research

1. Methodology and Presentation

   a. Methodology

      - Appropriate research design, and lack of specific weaknesses
      - Appropriate sampling
      - Appropriate data gathering methods or procedures
      - Validity and reliability established
      - Appropriate data analysis methods selected
      - Data analysis performed currently
      - Conclusions substantiated

   b. Presentation

      - Clear statement of problem, hypotheses, assumptions, etc.
      - Good review of the relevant literature, with problem under investigation clearly related to state of existing knowledge
      - Research design fully described
      - Population and sampling fully described
      - Data gathering methods described.
      - Analysis presented clearly
      - Results presented clearly
      - Conclusions stated clearly

2. Significance

   a. Significance of the problem selected for study

   b. Significance of the results

      - Contribution to theory
      - Contribution to practice

Even where "significance" is given considerable weight -- as in one study where "contribution to theory" and "contribution to practice" are two of the three dimensions of research quality rated (use of appropriate research methods is the third dimension)[62] -- "contribution" is not defined. Clearly, it is a matter of pure judgment; the more expert the judge selected, the more confidence we can probably have in the assessment made of the likely contribution made by a given piece of work.

Some evaluation checklists take note of the significance of the problem selected for study, while others focus on the significance of the research results. This is an important distinction since in education it has been noted frequently that researchers often select significant problem areas but the research that they produce contributes little to the solution of those problems or even our understanding of them.[63]

iii. Summary

In summary, most educational research has been described as poor in quality, as judged by either methodological rigor or the contribution made to theory or practice.

b. Significant Bodies of Research

Up to this point, we have noted how little of the prodigious quantity of educational research that has been produced has been judged to be of good quality. However, included in the educational R/D&I literature are several analyses that frame the quality question somewhat differently and arrive at a considerably more favorable assessment.

The question addressed by these analyses generally takes the form of either: "Has research affected practice?" or "Has there been quality research which has had (and/or potentially could have) significant impact on educational policy or practice or contributed substantially to theory or understanding?"

Getzels approached the issue by describing how educational practice at different times over this past century has largely reflected dominant conceptions of the nature of the learner, and how these conceptions were derived in part from accumulated educational research. He traced the changed emphasis in educational practice from teacher-centered learning to student-centered learning to approaches geared to social interaction, and related each of these to shifts in the dominant paradigms stimulating psychological and learning research.[64]

Griffiths' list of the most significant pieces of educational research produced in the previous ten years[65] included publications in the following research areas:

- Studies of the quantitative development of human characteristics (Bloom)

- Studies of the nature of intelligence; the structure of intellect (Guilford)

- Studies of individual development (Piaget)

- Effects of the environment on individual development (Deutsch et al.)

- Application of computer technology to studies in learning theory (Suppes)

- Biochemical approaches to learning and memory (Gaito)

- Characteristics and styles of administrators (Hemphill et al.)

- Talents of Young People - Project Talent - (Flanagan et al.)

In their report on educational research, the National Academy of Education identified four chains of significant inquiry as illustrative of the influence of fundamental research on educational practice:[66]

- The body of work done on mental tests and pupil classification, as the basis for the omnipresence of standardized testing to assess student progress;

- The philosophy of pragmatism and its influence on curriculum reforms reorienting learning away from the goal of learning for its own sake and toward the goal of learning to facilitate problem solving;

- Thorndike's work on reinforcement in learning and its impact on the use of drill in the teaching of arithmetic; and

- Views of the politics of education derived from a body of historical studies that have influenced educators' thinking about the forces that affect educational change.

Another example comes from the recent report of the National Academy of Sciences Committee on Fundamental Research Relevant to Education.[67] They describe eight research topics on which fundamental research has had and/or potentially could have significant influence on the solution of educational problems:

- Cognitive development
- Informal education and life-long educability
- Literacy
- The brain and neural processes; increasing learning capacity
- Change and innovation in organizations
- Higher Education
- Cultural Pluralism
- School environments

Our final example should be noted as well. In the 1969 OE status report, Hendrik Gideonse and his staff at the then-extant National Center for Educational Research and Development identified four areas of research as illustrative of research that had significant implications for educational policy and development work:

- early learning (research on cognitive growth and child devlopment showing the critical importance of the early years)

- individual differences (in mental abilities, achievement aptitudes, cognitive styles, and motivational factors)

- professional roles of educators (research on teacher effectiveness, teacher role, and teaching methods)

- noninstructional variables (research on the powerful effects of socioeconomic variables, peer influence, political structure, cultural variables, and the like)

Included in the presentation were specific examples of actual or potential applications of these bodies of research to development activities and to areas of educational policy.[68]

These various listings of areas of outstanding research are impressive. However, at least two points must be underscored about the research outputs noted here.

First and most obvious, almost all of the entries are drawn from the disciplines (especially psychology) rather than from educational research per se. They reflect the contributions made by fundamental research relevant to education rather than outputs of the field of educational research. Little of it has been carried out by researchers who identify themselves as educational researchers, or who are affiliated with educational research associations, or who publish in educational research journals, etc. These listings indicate that many fundamental researchers of outstanding quality are carrying out work relevant to education, and at least some of these (e.g., Bloom, Suppes) have become active in leadership roles in the field of educational research. Perhaps this says something about the supply of research talent from other fields who might be attracted to educational research. <u>But</u>, few of these listings can be pointed to as proof of the quality or vitality of <u>educational</u> research.

A second point suggested by most of these items is made particularly well in several of the discussions in the literature of <u>how</u> research influences practice and therefore what criterion should be used in judging its significance.[69] Research of a fundamental nature generally becomes influential as part of a cumulative body of knowledge (". . . a single finding is rarely important in itself, but acquires importance because it fits a system of findings . . . major contributions are usually series of interconnected studies conducted by a number of investigators"[70]). Such research influences practitioners not by pointing to direct applications to specific practices but rather by changing their ways of thinking, affecting their conceptions of schools, learners, education, etc. Thus the importance of the "contribution to theory" criterion of research quality noted earlier. And, the "contribution to practice" criterion must be understood in these terms, an understanding which seems little in evidence when practitioners are asked in survey research to describe how research has affected their practice.[71]

One might argue, then, that there may be significant bodies of educational research that have affected practice but are not identified by the empirical methods generally used to rate the quality of educational research outputs. Existing methods may be weak in focusing too heavily on individual research publications, or in misconstruing how research contributes to practice.

Still, the overall judgment of educational research as poor to mediocre in quality seems little changed even after we take these factors into account. Clearly, little of the research of significance that can be identified has been produced by the educational research community.

B. Development Outputs

Judgments of the quality of educational development outputs fall into a pattern quite similar to the pattern described for research quality.

a. Assessments of Generally Mediocre Quality of Most Development Outputs

In general, the development outputs that have been produced are judged to be disappointing in quality. These general judgments tend to be made about outputs produced by activities and projects specifically labelled as "R&D" (for instance, the development outputs of the labs and centers or the work of private sector contractors performed in response to federally-initiated RFPs). The materials production and program development activities of operating system personnel and units are generally not conceived of as R&D (or R/D&I, or KPU) outputs by most writers who make these judgments. The judgments are often made in a context of assessing what return has been forthcoming on the federal investment that has been made in educational R&D (i.e., development). The field has not as yet reached consensus on the boundaries of educational "development" -- we tend to include "practice-based/practice-related" development work;[72] most others tend to restrict their usage to only rigorous, systematic development processes as they are found most often in specialized development organizations.[73] But certainly, if the materials, programs, teaching approaches, etc. developed by school systems (and their practice-related arms in schools of education, state departments of education, publishing houses and the like) were generally regarded as first rate, we would not find so much emphasis on "improving educational practice." Therefore, it seems safe to conclude that most development outputs produced by the educational R/D&I system -- whether by specialized R&D organizations or by practice-based or practice-related operations -- are regarded by and large as poor in quality.

b. Identification of Exemplary Outputs

While most development outputs are viewed as poor in quality, there are clearly a significant number of programs, products, packaged practices, etc. that have been judged by one or another group to be of outstanding quality.

i. Exemplary Outputs of Systematic R&D

During the late '50s and early '60s, the NSF Course Content Improvement Program brought together eminent scholars to develop new high school science and mathematics curricula and materials designed to bring to the high school level student insight and understanding of these subject areas, the structure of these fields of knowledge, and their methods of inquiry. Utilization data gathered in the '60s indicated that the materials were used by hundreds of thousands of students (e.g., NSF estimated that 50% of all high school chemistry students in the country in 1968 were using the CHEM study program and materials). The impact of these programs was seen not only in the revision of high school science and mathematics programs but also in introductory college courses, revised to take into account the knowledge high school students brought with them as a result of using these materials.[74] So much excitement was generated by these new programs that they stimulated similar projects in such diverse subject areas as the social sciences and English and produced new curricula and materials for the elemenatry as well as the secondary levels.

More recently, exemplary R&D products have been identified and described in reports produced by the American Institutes for Research and the Far West Laboratory for Research and Development.[75] Table 8.7 reproduced from NIE's 1976 Databook, was put together from information in these reports.[76] Examination of the entries in the table suggests several observations that need to be underscored. First, the products cover a wide range of the R&D output spectrum, from curriculum to scheduling systems and new organizational arrangements, from toy lending libraries and preschool television programming to teacher training programs, from career education and drug abuse to more traditional subject areas such as reading, science, mathematics, and social studies, from preschool through secondary school and including pre-service and in-service teacher training as well,

TABLE 8.7

Recent "exemplary" products of education R&D, their developers, and their utilization histories

Exemplary Product*	Developer	Utilization History
Arithmetic Proficiency Training Program (computer-assisted instruction to supplement elementary arithmetic)	Science Research Associates (division of IBM), Chicago, Ill.	About 100 [illegible] in [illegible] locations
Cluster Concept Program (vocational training for high school juniors and seniors)	University of Maryland, College Park, Md.	Initially used, then discontinued, by State of Maryland. Other States are now considering it.
Creative Learning Group Drug Education Program (multimedia materials on drug use and abuse for elementary and junior high students)	Creative Learning Group (division of Media Engineering Corporation), Cambridge, Mass.	250 kits had been sold by 1971 and 7,500 students reached
Developmental Economic Education Program (curriculum for the development of "economic literacy" among elementary and secondary students)	Joint Council on Economic Education, New York, N.Y.	At least 7 million students in 150 school districts have been involved with the program.
Distar Instructional System (curriculum in reading, language, arithmetic and related subjects for preschool and early elementary grades)	University of Oregon, Eugene, Oreg.	It is [illegible] students in 5,000 schools are using Distar.
Drug Decision Program (multimedia materials for students in grades 5-8)	Lockheed Educational Systems, Sunnyvale, Calif.	More than 250 school districts have purchased the DDP. More than 400,000 students may have used it.
Edison Responsive Environment Learning System, or the Talking Typewriter (computerized typewriter with audiovisual capabilities, primarily for reading instruction)	Thomas A. Edison Laboratory (division of McGraw-Edison Corporation), Englewood Cliffs, N.J.	At least 150 typewriters are installed at [illegible] centers in the United States and Israel.
Educational Television for Preschoolers: Sesame Street (national public broadcast for home and school viewing by preschool and kindergarten children)	Children's Television Workshop, New York, N.Y.	It is estimated that Sesame Street reaches 93 to 95 percent of its potential young audience.
Facilitating Inquiry in the Classroom (inservice teacher training to stimulate students in self-directed inquiry)	Northwest Regional Educational Laboratory, Portland, Oreg.	Several thousand teachers have participated in workshops. About a dozen colleges and universities have also adopted the materials.
Frostig Program for Perceptual Motor Development (enhances perceptual-motor abilities in kindergarten through grade 3)	Marianne Frostig Center of Educational Therapy, Los Angeles, Calif.	Materials sales up to 1970 were 750,000 units. At that time, 200,000 students had been involved.
Hawaii English Program (presents the English language as a set of skills, a system of communication, and a medium of [illegible] grades)	Hawaii State Department of Education (in cooperation with the University of Hawaii), Honolulu, Hawaii	Installed throughout Hawaii.
Holt Social Studies Curriculum (stresses inquiry approach to the study of history and social sciences in the secondary grades)	Carnegie-Mellon University, New York, N.Y.	The publisher has been selling about $1 million of the HSSC materials per year.
Individually Prescribed Instruction ([illegible] of elementary mathematics [illegible] determined by [illegible] individual students)	Learning R&D Center and Research for Better Schools, Pittsburgh and Philadelphia, Pa.	Installed in more than 300 schools.
Inquiry Development Program in Physical Science ([illegible] grades 6-9 that features "discrepant events" to challenge student inquiry)	Science Research Associates (division of IBM), Chicago, Ill.	Projections [illegible] show the IDP may have been used by [illegible] to 500,000 students.

TABLE 8.7 (cont.)

[illegible] Continued

Title (Content)	Developer	Use or Diffusion
Intermediate Science Curriculum Study, or Probing the Natural World (junior high [illegible] that focuses on both [illegible] and [illegible])	Florida State University, Tallahassee, Fla.	200,000 or more students in all States of the country are using ISCS.
Kindergarten Program, or First Year Communication Skills Program (teaches basic skills of English language communication)	Southwest Regional Laboratory for Educational Research and Development, Los Alamitos, Calif.	About 200,000 students have used these materials.
Man: a Course of Study (social science curriculum for grades 5-7)	Education Development Center, Cambridge, Mass.	Used by least 200,000 students.
Materials and Activities for Teachers and Children, or MATCH boxes (elementary programs to aid skills development through experience with actual materials)	Children's Museum, Boston, Mass.	More than 200 copies of each unit have been sold throughout the United States. Each year, about 700 classes borrow MATCH from the Children's Museum in Boston.
Minicourses ([illegible] designed for [illegible] training [illegible])	Far West Laboratory for Educational Research and Development, San Francisco, Calif.	More than 1,600 Minicourses have been [illegible]. Publisher's [illegible]
Multiunit School — Individually Guided Education ([illegible] organizational system that replaces traditional self-contained classrooms with larger nongraded units)	R&D Center for Cognitive Learning, Madison, Wis.	More than 1,000 elementary schools have implemented IGE.
New School of Behavioral Studies in Education (alternative model of teacher education for practicing teachers with less than BA degree)	University of North Dakota, Grand Forks, N. Dak.	Teachers from 75 schools participated in the project. About 700 degrees were conferred.
Parent/Child Toy Lending Library (concept-teaching toys to be used jointly by 3- to 4-year-old children and their parents)	Far West Laboratory for Educational Research and Development, San Francisco, Calif.	At least 73 Toy Libraries exist, but there may be more since the materials are easily copied, 1,300 librarian manuals have been sold.
Research Utilizing Problem Solving (provides teachers and administrators with skills to analyze situations, consider alternatives, and make decisions)	Northwest Regional Educational Laboratory, Portland, Oreg.	It is estimated that more than 100,000 teachers/administrators have used RUPS.
Science—A Process Approach (teaches elementary school science through processes of observing, measuring, classifying, predicting, inferring, etc.)	American Association for the Advancement of Science, Washington, D.C.	It is estimated that students taught with these materials number in the millions.
Science Curriculum Improvement Study (imparts "scientific literacy" to elementary school science through a framework of fundamental concepts)	University of California, Berkeley, Calif.	More than 1 million students in almost all States have used SCIS.
Simulation Games (classroom games teaching social, economic, political and other concepts)	R&D Center for Social Organization of Schools, Baltimore, Md.	More than 30,000 games have been purchased.
Sullivan Reading Program (basic reading [illegible] programed format)	Sullivan Associates, Menlo Park, Calif.	More than 5 million children are using Sullivan reading materials.
Taba Social Studies Curriculum ([illegible] social studies [illegible] development of thinking, [illegible], values, and feelings, etc.)	San Francisco State University, San Francisco, Calif.	Yearly sales average 25,000 guides.
Teacher [illegible] Children [illegible] ([illegible] bilingual education with [illegible] elementary school subjects)	New Jersey State Department of Education, Trenton, N.J.	About [illegible] teachers and 50,000 [illegible] involved in the program by 1973.

TABLE 8.7 (cont.)

Recent exemplary products of education R&D, their developers, and their utilization histories—Continued

Exemplary Products*	Developer	Utilization History
Variable Modular Scheduling via Computer (system for allocating a school's resources - personnel, facilities, and time - according to the school's overall purposes)	Stanford University and Education Coordinates, Palo Alto and Sunnyvale, Calif.	Used in perhaps 250 schools.

*These are the 30 recent products reported in the sources below. Descriptions are meant only to characterize, not to define or distinguish the products. Space does not permit mentioning the many publishers and school systems that participated in later phases of development. Utilization histories are generally out of date, the extent of use is therefore underestimated.

Sources: D.A. Kratochvil et al., *Product Development Reports* (Palo Alto, Calif.: American Institutes for Research, 1972); B.J. Turnbull et al., *Promoting Change in Schools: A Diffusion Casebook* (San Francisco: Far West Laboratory for Educational Research and Development, 1974).

from hardware to simulation games. Second, the materials have been developed in almost every type of institution in the educational R/D&I system - universities, labs and centers, other non-profit organizations, for-profit corporations, and SEAs. Finally, the estimated utilization histories (which are out of date and therefore underestimate the extent of use) suggest that some of these outputs are used by millions of students.

ii. Exemplary Practices from School Systems

Innovative school districts have long been developing their own programs, curricula, and learning materials. Federal funds were infused into this process by the passage of Title III of the Elementary and Secondary Education Act in 1965. Title III was designed to create Supplementary Centers to deliver innovative services to school districts. A good deal of the money has been used to support the development and dissemination of "exemplary" practices developed by and for school districts. Various state mechanisms had been established to identify, validate, and disseminate Title III projects that were judged by state agencies to be successful programs worthy of dissemination for wider use.

Within states with strong dissemination programs (for instance, New York State), the identification, validation, and dissemination of exemplary practices and programs have received considerable support. Some states have put together compendia of effective programs[77] and developed various approaches to stimulate awareness of these programs and interest in their adoption. In addition, in 1974 OE created the National Diffusion Network "to encourage a free flow of successful ideas, products, techniques, and practices across state lines and to facilitate the replication of exemplary programs by school districts who determine that a given educational activity meets their needs".[78]

Table 8.8, reproduced from a recent evaluation of the National Diffusion Network,[79] lists the innovations selected by the National Diffusion Network for dissemination during the 1975-76 school year. This listing should suggest something of the range of types of program and practices included under the "exemplary practices" rubric - early childhood programs to promote learning readiness (including parent training programs); basic skills programs in reading, language, and mathematics; special programs for students with learning disabilities; programs in specialized curriculum areas (e.g., industrial arts, physical education, mass media); alternative programs for secondary schools needing some alternatives to the traditional curriculum for students experiencing difficulties in conventional school environments; programs to stimulate environmental awareness; and organizational arrangements and training programs emphasizing such strategies as open education, team teaching, and use of the community. For over a decade, Title III publications have been describing innovative programs developed by local districts. Clearly, the inventory of such programs available for dissemination and wide scale use is enormous.

c. Criteria Used in Judging Quality

Three different kinds of criteria seem to be used in the judgments of output quality appearing in the literature.

First, we find judgments made on the basis of evaluation research data and review of the validity and reliability of the evaluation findings. The criterion in these cases is that the program, materials, or whatever is being evaluated does in fact produce

TABLE 8.8

PROJECTS FUNDED AS NDN DEVELOPER-DEMONSTRATORS (1975-76)

Alternative/Secondary
- Project Adventure
- Alternative Learning Project (ALP)
- Curriculum for Meeting Modern Problems (New Model Me)
- High School in the Community
- Institute for Political and Legal Education (IPLE)
- Senior Elective Program

Early Childhood/Parent Readiness
- Added Dimensions to Parent and Preschool Education
- Cognitively Oriented PreKindergarten Experience (COPE)
- Dale Avenue Project
- Early Childhood Preventive Curriculum (ECPC)
- Early Prevention of School Failure
- Family Oriented Structured Preschool Activity Personalized (Seton Hall Preschool)
- Project Home Base
- Home Start
- Parent Readiness Education Project (PREP)
- Saturday School: Parent-Child Early Education
- Project SEE (Specific Education of the Eye)
- Strategies in Early Childhood Education

Environmental
- ECOS Training Institute
- Project ICE (Instruction-Curriculum-Environment)
- Project KARE (Knowledge Action to Restore our Environment)
- Pollution Control Education Center

Reading/Language/Math
- Project Aloha
- Alphaphonics Reading Readiness Training Program
- Project Catch-up
- Conceptually Oriented Mathematics Program
- Diagnostic/Prescriptive Arithmetic (DPA)
- Help One Student to Succeed (HOSTS)
- Project INSTRUCT (Instructional System for Teaching Reading using Continuous-Process Technology)
- Learning to Read by Reading
- New Adventures in Learning (NAIL)
- Project PEGASUS-PACE: Continuous Progress Reading Program
- Pupils Advancing in Learning (PAL)
- Right to Read
- Project R-3: Readiness, Relevance, and Reinforcement
- SDR: Systems Directed Reading
- Vocational Reading Power

TABLE 8.8

(cont.)

Reading/Language/Math (Continued)
Individualized Language Arts
K-3 Reading: Program Development Through Process

Specialized Curriculum/Special Interests
Community Planning Council on Educational Alternatives (CPCEA)
Drug Prevention Education
Health and Optimum Physical Education
Media Now
Occupational Versatility
Talents Unlimited
Urban Arts Program

Special Education/Learning Disabilities
All Children Totally Involved Exercising (ACTIVE)
Contract Learning for Educable Mentally Retarded Students
Engineered Classroom for Students who are both Educably, Mentally Handicapped and Behaviorally Maladjusted
Project FAST (Functional Analysis Systems Training)
Project FOCUS
Project IDEA
Project Learning Disabilities: Early Identification and Intervention
Northwest Special Education
Pilot Project Utilizing Supportive Personnel using Behavior Modification Techniques with Articulatory Disordered Children
Pre-K Prescriptive Teaching Project for Disadvantaged Children with Learning Disabilities
Re-Ed School
Remediation for Children with Learning Deficits through Precision Teaching: The Sacajawea Plan
Project SHARE: Sharing High Yield Accountability with Resource Educators
Project Success for the SLD Child

Training/Organizational Arrangements
Demonstration Evaluation Center
Disseminating Computer-Based Planning Resources through Project Simu-School: The Dallas Component
Project Learning Experience Module
PATL: Positive Attitudes Toward Learning
St. Paul Open School
Project Success Environment

the kinds of desirable results claimed by its developers. An example of use of this criterion would be the products certified by the Joint (OE/NIE) Dissemination Review Panel (JDRP). This panel was established to examine products developed with OE (and later, OE or NIE) funding and relevant data on effectiveness submitted by product developers. After scrutiny of the evaluation procedures, data, etc., this panel makes judgments on product effectiveness and certifies that those products which pass their review warrant dissemination. (All programs or practices disseminated by the National Diffusion Network, for instance, must first be validated by the JDRP.) According to NIE's 1976 Databook, 75 of the 100 products submitted to the JDRP as of the end of 1975 had been certified as effective.[80]

Second, and most common, we find judgments of quality with largely unspecified bases, comparable to the "expert opinion" we noted earlier in our discussion of judgments of research quality. In one study, for instance, a panel of experts were asked to examine a set of innovations and respond to the following rather general question of quality: "Indicate what you believe to be the educational worth of each innovation when properly installed from (1) low to (5) high."[81] Interestingly enough, in the one study in which this amorphous criterion was used, there was a reasonably high degree of consensus among the judges on the ratings of innovation quality.[82]

Generally what seems to be operative in these cases is expert or user judgment of "comparative advantage," i.e., that some new product or program is clearly superior in content, presentation, etc. to existing outputs that would be used to meet the same need. Both the NSF Course Content Improvement Program outputs (PSSC Physics, BSCS biology, CHEM chemistry, etc.) and Sesame Street were widely acclaimed (at least early in their histories) based largely on this somewhat amorphous kind of criterion. In both cases, these outputs were judged by various experts (and others) to be superior in content, presentation, etc. The judgments were made even before evaluation data on effectiveness were available. And these judgments have continued to hold by and large even after evaluation data suggested that they might not have been as effective as some of the initial claims, or they may have been effective with only certain segments of the population and not with others for whom they were intended. Given the state of evaluation research methodology, such expert judgments may in fact have more validity to them than all the evaluation data that have as yet been assembled.

Although product quality and extent of utilization are two variables that are not necessarily highly correlated,[83] one indirect criterion that is often used is extent of utilization. No doubt, the wide usage of this criterion is attributable in part to the ease of collecting and reporting utilization data. But also, perhaps, the use of these data may reflect an assumption that market forces are valid as measures of what schools want, and that (at least in some rough way) what schools want is programs that provide a degree of quality without at the same time being incongruent with the school's organizational and environmental constraints. It should be noted, though, that the one study that gathered data on both innovation quality and frequency of use concluded that there are four types of schools: (a) pacesetter schools, which adopt large numbers of innovations, including most high quality ones; (b) faddist schools, which adopt large numbers of innovations, but few of these are high quality ones; (c) selective schools, which adopt fewer innovations, but those they adopt include most of the high quality ones; and (d) backward schools, which adopt few innovations, and few of those are among the high quality ones. As shown in Table 8.9 reproduced from this study,[84] 22% of schools are categorized as pacesetters, 24% as faddist, 24% as selective, and 40% as backward. Clearly,

TABLE 8.9

Typology of Discrimination in the Adoption of Innovations *

		Proportion of high quality innovations adopted	
		High (more than 50%)	Low (50% or less)
Number of innovations adopted	High (5 - 14)	22% Pacesetter schools	24% Faddist schools
	Low (1 - 4)	14% Selective schools	40% Backward schools

N schools = 653

* Three innovations with low consensus on quality are excluded.

then, the correlation between quality and frequency of use is high only in certain schools and is particularly low in the 24% of schools labelled as "faddist".

d. Summary

Clearly, then, although the prevailing view seems to be that most of the outputs of educational R&D to date have been poor in quality, there are also a good number of exemplary products that are widely used. When the outputs of practice-based development are also considered, it appears that large numbers of exemplary programs and practices have been identified by various agencies, and many of these have been validated and certified by reviewing bodies. The key problem in the case of practitioner-developed outputs may be inadequate visibility and dissemination. In the remainder of this chapter, we turn to some of the implications of this state of affairs.

IV. POLICY IMPLICATIONS

Based on our analyses, there would seem to be a need for policy initiatives toward at least three objectives: (1) capturing in usable form much of the "invisible" knowledge accumulation and innovation to be found in the educational R/D&I and operating systems; (2) establishing more effective quality control mechanisms to distinguish between high and low quality outputs and increase the likelihood that only the high quality outputs get disseminated for wide scale use; and (3) raising the quality of the research and R&D outputs produced by the educational R/D&I system.

1. Increasing the "Visibility" and Usability of "Invisible" Outputs

If strong programs and practices developed in schools are to be used effectively in other schools, and if new techniques and understandings of R/D&I processes carried around in the heads of first-rate R/D&I personnel are to be available for use by others, attention will have to be focused on increasing the concreteness of many more amorphous outputs of R/D&I functioning.

At the very least, what we have in mind is the packaging of exemplary practices and programs, to a point that will permit their effective use by others without driving the costs too high or producing overly complex outputs that discourage adoption or implementation. If we are to be in a position to further this "mixed mode" of development (i.e., development activity in the practice setting but external validation, packaging, etc.), we will need to develop considerably more understanding than we have now about what kinds of process information practitioners need to effectively implement various kinds of programs or make effective use of various kinds of products. We also need to learn more about the output forms that are most cost-effective for providing this information, and the degrees of concreteness, complexity, etc. most preferred by practitioners. To produce this kind of information, what would seem to be needed is the development of an implementation research specialty and a personnel base of researchers who focus their attention on the practice setting, its needs, requirements, constraints, and preferences and are gifted observers and analysts of classroom behavior and school structures and processes. The collaboration of such researchers with teams of instructional packaging specialists might produce the kinds of cost-effective output forms that would provide evidence over time of both high quality and wide use.

For R/D&I system personnel, other kinds of amorphous, invisible outputs need to be captured in more concrete, usable forms. Relatively little exists in the literature about R/D&I processes - the "how to" information carried around in the heads of first-rate developers, dissemination specialists, change agents, implementation/utilization support personnel, etc. There is considerably more of that kind of information available for various research specialties and evaluation, but even here we sense considerably more process information and "ways of thinking" could be captured and made accessible for use by the field.

Some talented R/D&I specialists could probably put some of this down in print or show some of it through use of videotape or other media. Others, however, probably could not explain what they do, but still are models from whom the field could learn. To capture what it is these people do that accounts for the quality of their efforts, we probably need to develop a "process analysis" research specialty and build into the awarding of various kinds of grants and contracts a provision for these process researchers to study how the work is carried out, to explore and elaborate on the processes and patterns of thinking used, and to produce outputs which make what they learned accessible to the rest of the field. We are already beginning to see some developments of this kind, for instance awards to "third party researchers". We would call for considerably more of this, along with concerted attention to developing the social and communication mechanisms and information flow structures of the various specialties and making use of these mechanisms and structures through commissioning state of the art papers, publishing annual state of the art reviews and handbooks, etc. Such policies would seem to be essential if we are to speed the maturation of the educational R/D&I system and thereby raise the quality of R/D&I outputs.

2. Establishing More Effective Quality Control Mechanisms

Given the enormous quantity of research and R&D outputs and the mediocre quality of most of these, there is a serious need for more effective quality control mechanisms. When potential users are overwhelmed by the quantity of what is available, and find much of what they try to use poor in quality, they tend to stop using the available search mechanisms as wasteful of their time. Thus, the high quality outputs get buried in the voluminous quantities of poor quality outputs, and are no better disseminated and perhaps no more widely used. (ERIC would seem to be a good illustration of this.)

Clearly, more effective quality control mechanisms will need to be developed. They will have to be used more aggressively to separate out the high quality outputs, and the message will have to get out loud and clear that this has been done and that the outputs that successfully pass through the screening process are worthy of consideration and use.

This will, however, be an enormously complex process given the diversity of output forms, the broader range of substantive foci, and the fact that different criteria will have to be developed for each output form and different substantive specialists will have to be involved in making these judgments for the outputs in each substantive area. Also, it would seem essential to develop criteria of quality that take into account who the user of each set of outputs is likely to be and what that kind of user's requirements are likely to be.

To accomplish this, it would seem necessary to develop a much better data base than we now have available to us about the practice setting and the requirements for effective implementation and use of various kinds of programs and products, by various kinds of users, in schools with varying implementation-relevant characteristics. We will, therefore, need more practice-based research, and we will need to include practitioners in any efforts to develop or apply criteria of output quality.

Quality control mechanisms are already operative in the research community - in the form of journal reviewers, syntheses and critiques in review articles, etc. Still, considerably more of this would seem to be needed, especially to insure the cumulative development of a quality knowledge base for each research area. Also, we need to establish these mechanisms for other R/D&I areas - development, dissemination, implementation/utilization support, etc., and make certain that the process analyses and other outputs produced to develop the state of the art in these specialties are subjected to the same kind of careful quality control screening as the development outputs produced for practitioners.

3. Raising the Quality of Outputs

While the measures we have suggested above should indirectly raise the overall level of quality of the outputs the system produces, some other more direct steps would also seem to be necessary if significant improvement is to be seen in the quality of these outputs.

First, it seems essential to make program and project selections on the basis of criteria that include an assessment of the state of development of the underlying knowledge and technology base to support a given type of projected output. Is existing knowledge and technology adequate? Or, must development work in a given area be viewed as premature given the remaining unknowns at the current time? In the case of fundamental inquiry, is a proposed research question the right question to further the state of knowledge in a given area? Does it adequately take into account what is already known? In the case of a proposed evaluation, is existing evaluation methodology and instrumentation adequate to satisfactorily answer the questions posed? And so on.

If these kind of criteria are to be developed and used, we will need to develop a much better information base than we have available to us now about the state of development of each segment of the field's knowledge and technology base. It would seem advisable, too, to have available for policymakers an assessment of: (a) which knowledge/technology bases are best developed at this point in time, to support what kinds of needed development work or applied research; (b) which evaluation technologies are developed to a high enough level to provide strong results to inform policymaking; (c) which areas of fundamental inquiry merit priority attention - whether because of their potential for shedding light on issues of fundamental significance, or because of the significant kinds of applied work that cannot be undertaken until further progress is made in answering fundamental questions in these areas, etc.

Other direct steps to raise quality would seem to be needed as well - for instance, making certain that government-funded work is awarded only to quality institutions and first-rate personnel (possibly through increasing use of sole source procurements and "special relationships", matters we consider more fully in our chapter on funding); or increasing the mandatory use of advisory panels throughout the life of funded projects to insure ongoing review by those with strong expertise in a given area (researchers, practitioners, R&D specialists), considerable feedback on needed improvements, ongoing modifications, etc.

Clearly, more direct attention needs to be focused on the quality issue. Indirect, after-the-fact quality control and screening mechanisms are a wasteful, inefficient approach to upgrading overall output quality. What would seem to be called for are more imaginative and more forceful policies to insure that funds are awarded to only those proposals, institutions, and personnel that seem to offer from the very outset a strong likelihood of producing quality work.

V. DATA BASE AND MONITORING SYSTEM REQUIREMENTS

Ideally, we would like to see the development of a data base and monitoring system that would allow us to accomplish several purposes: to inventory outputs; relate quantities of outputs to areas of need; relate outputs to quality criteria; relate outputs to inputs (funds, personnel, time in terms of both elapsed time and man-hours, state of development of relevant knowledge/technology bases, etc.); relate quality of outputs to information about management strategies used; relate output information to utilization data; assess the extent of change over time in quality of outputs, imbalances in meeting different needs, etc.

To achieve at least some of these objectives, it would seem necessary to gather on a periodic basis data on all the outputs produced by the various R/D&I performer organizations and perhaps, too, all the various kinds of outputs used by school systems throughout the country. We would want to be able to determine <u>who</u> is producing <u>what</u>, and <u>who</u> is using <u>what</u>, how much of what is being produced is being used, who is producing most of what is being used the most, and what kinds of outputs are getting the greatest amount of use, by whom.

We have already noted in an earlier section how the large numbers of output types and substantive foci of outputs are likely to complicate any attempts to develop a useful data base and a monitoring system for output production and use. Still, if some ideal system were to be developed, it would seem to require the development of quality criteria for each output category, and the development of a system to apply these criteria to existing outputs in each category and to new outputs being developed. Establishing the criteria, setting up the review mechanisms, and applying them for the first time to the existing body of outputs are likely to be enormously complex, difficult and time-consuming tasks. But after this is done, the system is likely to operate with far less difficulty. What would seem to be called for would be periodic assessments of the quality of all outputs in each category produced since the last assessment cycle.

Periodically, too, these quality criteria would probably need to be reviewed, perhaps along with some of the earlier assessments of the existing outputs.

Having this quality information in the data base and monitoring system would enable us to examine such questions as: Is quality increasing? How much of what is being used is quality material? Is this showing any improvement over time: Who is producing the quality outputs? Is this changing over time? Who is using the quality outputs? Who is using outputs of lesser quality (and, perhaps in a subsequent study, why)?

A data base and monitoring system of this kind could enable us to assess the effectiveness of various policy initiatives that might be pursued in an effort to raise output quality. For instance, if the information on who is producing most of the quality outputs of a given type was then used to shift from open competition to sole source procurement for contracts to produce such outputs, the monitoring data over time could be analyzed to determine whether or not the effect was to raise the overall quality of outputs of that type, whether or not this meant increased use of R&D outputs in school districts, and perhaps too even whether or not this produced any measurable increase in cost-effectiveness or any measurable form or degree of school improvement. (This latter is, no doubt, somewhat farfetched, but it should be taken as at least suggestive of what becomes possible when a good data base and monitoring system are developed.)

Another possible use for a data base of this kind would be for the development of sampling frames for in-depth studies on particular policy questions. For instance, if we wanted to assess what it takes to produce quality outputs of a given type, we might use this data base to identify the quality producers of these outputs and then study these organizations in depth to learn more about requirements for quality work of a given type - what level of funding, to what specific tasks, carried out by what kinds of personnel, using what standards of quality. over how long a time period, working through what standards of quality, over how long a time period, working through what kinds of collaborative relationships with what other kinds of institutions or personnel, using what kinds of strategies to manage the enterprise and to insure quality.

We have been brief in sketching some of our thoughts about the type of data base and monitoring system we think is called for to ultimately improve system quality. In the next section of this chapter, we focus in some detail on one small piece of this larger data base - i.e., information about output attributes and the manner in which they may affect KPU processes and require different kinds of management strategies if the outcome is to be a first-rate, widely used program or product. We consider this small segment of the broad data base in considerable detail because developing effective R/D&I management strategies is a matter of keen interest to us, and also because we think this discussion should illustrate the kind of thinking that may be needed as a basis for determining what categories of data need to be gathered and what sorts of analyses may be needed to make the information useful for improving the quality of system outputs.

VI. IMPROVING OUTPUT QUALITY: AN OUTPUT TYPOLOGY FOR THINKING ABOUT NEEDED MANAGEMENT STRATEGIES

Throughout this volume, we tend to direct our attention toward macro (system) level policy and management initiatives our analysis suggests are needed. We give less attention to management strategies on the micro level of individual institutions, projects or programs. We did not see micro-level analysis as feasible within the scope of this particular analysis, for it opens up a whole vast new and undeveloped area in need of exploration. However, since we are concerned in this chapter with output quality and its improvement, and since the improvement of management strategies on the institutional level would seem to be of considerable importance here, we have given some consideration here to the matter of micro-level management strategies needed to improve output quality and how we might usefully think about the body of management know-how that needs to be developed.

In some never-to-be-realized, idealized future state of development of the now virtually non-existent specialty of educational R/D&I management, there might exist a body of knowledge that would suggest management strategies applicable to each set of R/D&I <u>functions</u> and processes, carried out in order to bring about the development and utilization of each type of R/D&I <u>output</u>, under various conceivable contextual, environmental, or organizational <u>constraints</u>. Other chapters in this volume consider the various R/D&I functions and processes as well as various kinds of constraints to be taken into account. In this section, we focus only on R/D&I outputs and consider the kind of output typology that might be useful for inventorying output management strategies.

Since this is intended to be only illustrative, we restrict our attention here to development outputs. Clearly, other dimensions would be relevant to a typology of research outputs and other kinds of considerations would enter into strategies for research management. We shall also restrict our attention to externally developed R/D&I

outputs. We recognize that products or practices developed within the operating system and then selected for wider dissemination are likely to entail somewhat different management requirements.

1. Assumptions

Different kinds of development outputs have significantly different R/D&I requirements -- different resources to be assembled, different organizational arrangements to permit the most effective and efficient use of these resources, different R/D&I activities to be carried out, different standards to be applied in evaluating product effectiveness, different production processes, etc. On the utilization end of the KPU spectrum, different kinds of externally developed R/D&I products are likely to require different sorts of dissemination and marketing strategies and pose different sorts of problems for operating systems confronting decisions about adoption, implementation, and utilization.

Several analysts have distinguished among types or attributes of innovations or R/D&I products or outputs. Some of these distinctions are applicable to innovations in general; others are specific to educational products and innovations.[85] Most of the literature that considers the attributes of innovations falls within the diffusion research tradition. The properties of primary concern to these analysts are those that facilitate or hinder the adoption and spread of the innovation.

Our concerns are with the entire creation-to-utilization life cycle of an output, beginning with need identification, continuing on through the KP functions of research (or idea generation), development, and evaluation, then on to production, dissemination/marketing, and distribution, and finally through the knowledge utilization end of the KPU spectrum, including not only the adoption/acquisition process but also implementation and utilization as well. One of the themes that appears throughout this volume is the need to increase the degree of integration that exists between the KP and KU ends of a product's history. Therefore, in developing our typology we have focused our attention on both the KP and KU requirements of educational R/D&I outputs.

For simplicity of usage, we shall refer to all outputs as "products," though clearly the term is not appropriate to all outputs we might consider. We shall also often use the term "innovation," but much that we say here is equally applicable to conventional outputs that are not particularly innovative.

It should be possible to classify any given educational product in terms of its various KP and KU requirements. Various combinations of KP and KU requirements should occur with notable frequency, yielding a number of product types. Outlined in the remainder of this chapter is our initial thinking on the KP and KU requirements and attributes that seem significant enough in their impact on KPU processes to warrant inclusion in the formulation of this typology, and the combinations that seem to suggest what such a typology might look like.

2. KP Requirements

The KP requirements of any product can be described in terms of the quantity and types of resources that must be organized and managed to bring about its design, development, evaluation, and production. These requirements can be visualized along a continuum. On one end, we would place a 10-page set of learning materials designed by one teacher working alone as an addition to the materials she uses in teaching a single unit in a single classroom in a single school. On the other end of the continuum, we would place a hypothetical multimedia K-12 instructional system for teaching reading and then providing substantive instruction in the full range of subjects taught in elementary and secondary schools across the nation. The latter example would entail managing KP resources of considerably greater scale and complexity -- an extensive amount of development funding, a broad personnel skill mix, a wide range of functional and subject matter specialties, an extensive amount of research and numerous lengthy development and evaluation cycles, collaborative arrangements among various organizations and/or divisions of a single organization (e.g., hardware/software subcontracting errangements), etc.

Our scheme, therefore, calls for analyzing the KP requirements of any given type of product in terms of the quantity and types of KP resources to be assembled and managed, including funds, personnel, functional and subject matter specializations, and technology. The frequently-made distinctions between hardware and software, and between packageable products and less tangible processes, would be subsumed under these resource headings.

3. KU Attributes that Suggest KPU Requirements

We distinguish two partially overlapping sets of attributes that influence the fate of an innovation in the KU system: (A) attributes that affect the willingness of school officials and school personnel to adopt and try an innovation; and (B) attributes that affect the abilities of school personnel to implement and utilize the innovation effectively. The first set suggest important requirements to be met primarily by the packaging and dissemination/marketing functions. But certainly consideration of these requirements throughout the KP life cycle of a product would minimize difficulties in packaging and dissemination. The second set of attributes point to implementation supports that may have to be investigated, designed, developed, and evaluated as carefully as the innovation itself.

A. Attributes that Affect Willingness to Adopt

In his classic analysis of the diffusion of innovations, Rogers identified five characteristics of innovations that accounted for variance in their diffusion rates: relative advantage, communicability, divisibility, complexity, and compatibility.[86] All five are useful for predicting the degree of difficulty a given innovation is likely to encounter in the adoption process, and therefore what KP, packaging, and dissemination strategies might be required. (As we shall see shortly, some of these attributes are also useful for predicting implementation problems, and therefore for suggesting implementation supports to be developed along with the innovation itself.)

a. Relative Advantage

Is a particular product clearly superior to the product or practice that it would replace (e.g., in effectiveness, cost, durability, ease of use, etc.)? Not all products in the educational marketplace are intended to displace existing products or practices. Many are intended as additions, to supplement what is used currently. But given limited time for instruction and limited resources to purchase materials, most additions are bound to displace something in current use, and therefore questions of relative advantage are bound to arise, even with seemingly supplementary materials.

Questions of relative advantage are often difficult to answer in relation to educational products. Given the nature of the educational knowledge and technology base, and especially the relative immaturity and underdeveloped state of the evaluation research function, it is often not possible to get a clearcut appraisal of the effectiveness of a given product. Even in the relatively rare cases where evaluations have been conducted and evaluation data are made available to the user system, the product competes with established practice or other products in the marketplace that have not been so evaluated. Few mechanisms exist to provide comparative evaluative information about the complete range of products of a given type competing for a given use in the educational market.[87] Therefore, the school board, administrator, or teacher considering adopting and/or using a particular product has little strong evidence on which to make a judgment of relative advantage.

Given the financial problems of school systems in recent years, cost considerations have become a factor of major importance in the adoption/acquisition stage of a product's life cycle. If a new product is less costly than the one it replaces, adoption probability is enhanced. But innovations are rarely cost-reducing. Often, they are quite costly, and the problems are complicated by the "soft" money funding patterns frequently used to encourage the diffusion of certain types of innovations. Federal money may be offered as an incentive for school systems to adopt and utilize a complex instructional system that requires major restructuring of a school's instructional and administrative processes. The federal money pays for all costs for a three-year installation and trial period. However, after the trial phase is ended, the federal money flow terminates and the costs must be absorbed by the local school district. The school faces a serious dilemma: either it must take the added costs out of its already tight operations budget, or, after having restructured the school's instructional and administrative processes in accord with the innovation's requirements, it must drop the program and perhaps again go through the strains of restructuring, this time to return to the old pattern. Unhappy experiences of this kind make school districts wary of adopting innovations supported by "soft" funding.[88]

If the educational marketplace is to become more orderly, innovation management will have to take the relative advantage criterion into account throughout R/D&I functioning -- in the questions asked during need identification, in the kinds of research questions investigated as a basis of product development, in the evaluation standards used to judge prototypes and versions of the developed product, in the evaluative data disseminated to user systems, in the packaging and marketing of a product, and in the macro-system efforts to bring structure and order to the acquisition function.

b. Communicability

How easy or difficult is it to communicate the effects of an output to a potential adopter? Communicability poses serious problems for most educational innovations. They tend to be harder to evaluate than technological innovations. The classic example used to illustrate this attribute is the farmer who experiments with a new hybrid corn. He plants the seeds, and within a reasonably short period of time gets a crop of hybrid corn. The superiority of the hybrid corn is clearly visible and easy to communicate. The relatively controlled conditions under which the experiment was performed permit the farmer to conclude confidently that the new seeds he planted were indeed responsible for his improved corn output.

The effects of educational innovations are less visible. Educational goals are less tangible. Educational effects are harder to measure. (And the statistical jargon used by those who do try to measure those effects generally fails to enhance an innovation's communicability.) It may take years before the full effects of an innovation become visible. And so many influences interact in the uncontrolled conditions of classroom, school, home, and community that it is rarely possible to trace an observed "effect" to a particular program or innovation. Consequently, it is more difficult in education to provide the potential adopter with clearcut information about an innovation's effects.

Some kinds of educational innovations have more measurable, visible, and obvious effects than others, and therefore pose less of a communicability problem. It would be relatively easy, for instance, to communicate the superiority of a low-cost, computerized scheduling and record-keeping system over conventional clerical procedures. But for most educational innovations, especially those targetted at instruction, it is generally difficult for developers to state unequivocably what effects the adopter can expect from implementing a given innovation. Consequently, the adopter is likely to be hesitant about risking resources on so uncertain an outcome.

Communicability barriers are being overcome where the development function is oriented towards producing products "with known outcomes"[89] -- i.e., testing a product sufficiently to be confident that it will reliably produce a specified amount of a specified effect under specified implementation conditions. Effective management of educational innovations requires this careful attention to communicability issues in both the development and dissemination functions.

c. Divisibility

Can an innovation be divided into components or phases that can be adopted and implemented on a stage-by-stage basis? Or, must the adopter make an all-or-nothing decision and attempt to implement the entire innovation at once? The less commitment an adopter must make to a novel approach, and the less change to be attempted at any one point in time, the more likely he is to commit himself to the innovation.

In education, divisibility takes on particular significance when the innovation under consideration is a wholly new instructional approach, of considerable scale and complexity, covering several grade levels and subject areas, perhaps requiring changes in school organization and administration as well as instruction -- conceivably even requiring modifications in physical facilities. (The transformation required by shifting from conventional to "open education" is illustrative of a pervasive kind of innovation of this kind.)

Where these complex innovations can be designed and implemented in stages -- grade by grade, and/or subject area by subject area -- adoption and implementation problems are minimized. Such staging needs to be planned for throughout the development function. Evaluation data need to be generated on the consequences of different patterns of staging. And implementation supports consistent with the staging need to be designed and provided as part of the innovation "package" to be adopted.

d. Complexity

How easy or difficult is it to use a new product? How much new technology is required by its use? How much staff training is necessary? A new film that depicts a laboratory experiment previously performed by the classroom teacher involves little complexity. Replacing conventional mathematics instruction with the "new math" or with use of interactive computer consoles involves far more complexity.

Complexity has obvious implications for the design of implementation supports. But it has equally significant effects on the willingness of school boards and school personnel to adopt different innovations. The more difficult it is for school personnel to understand how to use a given innovation, the more likely they are to resist its adoption and use. Even when they are willing to try it, greater complexity entails greater uncertainty about how well the innovation will "work" with these teachers in this setting. Therefore, decision makers are likely to be more hesitant to commit scarce resources to a complex innovation with ambiguous prospects for success. Also, greater complexity requires more staff training and other implementation supports, which are bound to further complicate school functioning. Consequently, even where implementation supports are provided to overcome the complexity inherent in an innovation, resistance to adopting and implementing the innovation is likely to remain to some extent. These problems suggest requirements that must be met in the course of product design, development, packaging, and dissemination, so as to minimize the perceptions of complexity and the resultant resistance to adopting and implementing the innovation.

e. Compatibility

To what degree is the innovation compatible with the attitudes, values, mores, sensitivities, past experiences, working styles, current practices, capabilities, etc. of user system personnel and the organizational structure and work patterns of the user system? To what extent does it require unlearning of old thought and behavioral patterns as well as learning of new ones? To what extent does it require changes in the user system that are incremental vs. radical? Does the new practice provide additional new resources, or does it require a change in the resource mix (e.g., from labor-intensive to technology-intensive) that creates conflict with vested interests?

The more compatible the innovation with existing arrangements, the more likely the innovation will be adopted, implemented, and utilized as intended. The less compatible with existing practice, the less likely it will be adopted, and regardless of official adoption, the less likely it will be implemented and utilized as intended rather than emasculated into "the same old thing" that was done before. Of all the attributes affecting what happens to innovations in the user system, compatibility is generally considered the most critical (especially for radically new R/D&I outputs), and is given the most attention in the literature.

Gradations of compatibility/incompatibility can be illustrated along a continuum, from most to least compatible, and zero to incremental to radical change requirements. For instance, point 1 might be represented by a new set of additional learning materials of the same type already in use in a given unit of a particular course. Point 2 might be illustrated by a new textbook covering a whole course, consistent in approach with the textbook currently used, but requiring some new lesson preparation. Point 3 might be a wholly new unit or course, consistent with existing instructional approaches, but requiring some administrative restructuring of curriculum offerings, scheduling, etc. Point 4 could be illustrated by a new curriculum for a given subject area on a given grade level, requiring some training of teachers in the use of new materials and/or instructional procedures. In instances where the teacher training requires teachers to unlearn old thought patterns and behaviors as well as learn new ones (e.g., learning the "new math"), we would categorize the innovation on, let us say, point 5. Point 6 might carry this pattern even further -- e.g., an innovation requiring teachers to unlearn old thought patterns as well as learn new instructional procedures covering not simply one subject but perhaps several subject areas or even all subject areas. Point 7 could be represented by an innovation that is not only comprehensive in subject area and grade level coverage, and not only requires extensive unlearning of old patterns and learning of new ones, but also runs counter to strong feelings about emotionally-laden issues -- e.g., questions of power, authority, and role expectations for teachers vis-a-vis students, administrators vis-a-vis teachers, school personnel vis-a-vis parents and community residents. This extreme degree of incompatibility can be illustrated by the shift from conventional education to "open education," or from traditional patterns of school system governance in large cities to "community control."

Innovations targetted at different school system functions tend to entail different degrees of compatibility or incompatibility. Innovations in physical plant are least likely to run counter to established attitudes, practices, etc. Innovations in the administration function (e.g., a new system for inventory and distribution of books and learning materials) are only slightly more likely to be incompatible with strongly held views about the ways schools should function. (An exception here might be an innovation like a management information system that could be used in a manner having significant implications for the instruction and governance functions -- e.g., using the data generated by the system to demand teacher accountability for student performance.) Innovations in the instruction function are very likely to be incompatible with existing practice if they are truly innovative and require radical change in the manner in which teaching and learning are carried out. And most likely of all to generate resistance are innovations in governance, conceived broadly here as changes in power, influence, and authority relationships among teachers, students, administrators, parents and other community residents. The fate of the tuition voucher idea illustrates the substantial resistance likely to be generated by radically new approaches to the governance function.

The greater the inherent incompatibility of an innovation with existing practice, attitudes, etc., the more this must be taken into account in KP functioning -- in the way the innovation is designed, developed, and evaluated, and especially in the way it is packaged and disseminated.

B. Attributes that Affect Ability to Implement

Three of the attributes we have analyzed affect the abilities of school personnel to implement a given innovation, as well as their willingness to adopt it. We shall consider these again briefly, suggesting for each the kinds of implementation supports that are required and therefore must be designed, developed, tested, packaged, and disseminated along with the innovation itself.

a. Divisibility

Complex innovations are likely to be implemented more effectively if they are divisible and can be installed in stages. Staged implementation suggests KP as well as KU requirements -- research on the most effective patterns of staging, design and testing of implementation supports for installing each stage, packaging and disseminating the staged implementation supports, and perhaps providing implementation specialists to give technical assistance during the staged implementation.

b. Complexity

The greater the inherent complexity of an innovation, the more implementation supports are likely to be needed -- more teachers' guides or how-to-do-it films; perhaps programmed instructional materials; certainly more teacher training; and perhaps, too, implementation specialists to work with teachers and administrators during the installation and trial period. If these implementation supports are to be maximally effective, we would argue strongly for integrating their design, development, and testing into the design-development-and-evaluation activities that are focused on producing the innovation itself.

c. Compatibility

All that we have said about the KP and KU requirements suggested by an innovation's complexity applies also to compatibility, but perhaps to an even greater extent. Overcoming incompatibility requires a special sensitivity to user system attributes, the kinds of changes in user system functioning made necessary by an innovation, and the kinds of problems these changes pose for user system personnel. The greater the incompatibility between existing practices and attitudes, on the one hand, and the demands of a given innovation, on the other, the more attention must be directed not only to developing an understanding of the changes required but acceptance also. Implementation supports must be targetted at not only the technological aspects of an innovation (e.g., changes in instructional procedures), but perhaps also differences required in attitudes, values, authority relationships, organizational arrangements, etc. The greater the incompatibility, then, the more essential it would seem to provide implementation specialists to work with school personnel during the installation and trial periods. Whether or not implementation specialists are provided, implementation supports need to be carefully designed, developed, and tested during the KP phase of the innovation cycle rather than generated intuitively during implementation. There is little evidence in education of this kind of KP activity directed toward KU requirements.

4. KP-KU Attribute Combinations: The Basis of an Educational R/D&I Output Typology

We have considered three dimensions on which educational R/D&I products and innovations can be analyzed: KP requirements; KU attributes that affect the willingness of operating system personnel to adopt an innovation; and KU attributes that affect the abilities of operating system personnel to implement an innovation effectively. We have assumed that these three dimensions of analysis are quantifiable in some rough way or other, and that any innovation can be placed somewhere on a continuum for each attribute or KPU requirement.

As a basis for developing a typology from these dimensions, we made two further simplifying assumptions. First, although we acknowledge that there are methodological problems in converting quantitative dimensions (e.g., degree of compatibility) into typological categories (e.g., high vs. low compatibility), we assume that it is both possible and reasonable for us to follow this procedure. Second, we assume that various output attributes and resultant KPU requirements tend to go together and have the same implications for integrated KP-KU product management strategies. (For instance, relative advantage and communicability are likely to go together and suggest similar kinds of KP requirements and management strategies. High levels of complex KP requirements are likely to be correlated with high degrees of KU complexity and incompatibility.) Enumerating these combinations, then, and considering the kinds of management strategies suggested by each, should be useful.

The procedure we followed in formulating our typology was quite simple. We dichotomized each of our three dimensions of analysis into high vs. low categories: (1) high vs. low KP requirements inherent in the innovation itself (i.e., number and complexity of types of manpower, functional specialties, subject matter specialities, funding, and technology); (2) high vs. low KPU requirements due to KU attributes likely to make school personnel more or less resistant to adopting the innovation; and (3) high vs. low KPU requirements due to KU attributes likely to make it more or less difficult for school personnel to implement the innovation effectively.

We then generated all possible combinations from these dichotomized dimensions, and thereby produced our eight-category typology.

A. Products with High Inherent KP Requirements and High KPU Requirements Because of Attributes that Pose Difficulties for Both Adoption and Implementation

An example of a type A output might be a comprehensive K-6, multi-media instructional system with unclear relative advantage and communicability, and substantial complexity and incompatibility. KPU management of this kind of product would require assembling and organizing a wide range of resources, especially complex personnel skill mixes and extensive funding. It might necessitate collaborative relationships among various contractors and subcontractors, posing significant coordination problems. The KU barriers to successful adoption and implementation suggest the need for KPU management that focuses specialized KP activities on these problems while the substance of the product is being developed. These activities might include evaluation, packaging, and dissemination activities directed at identifying and describing the innovation's effects, and especially its advantages over existing products and practices. These KU-oriented KP activities might also include development of teacher training and support materials and programs (teachers' guides, how-to-do-it films, training programs), perhaps too, supports for administrators, and maybe even packages for use by implementation specialists in technical assistance teams assigned to work with school personnel during the installation and trial period.

B. Products with High Inherent KP Requirements and Moderately High KPU Requirements Because of Attributes that Pose Difficulties for Implementation But Not Adoption

An example of a type B product might be a comprehensive grade

1-6 system of individualized instruction in reading and other subjects, requiring the same extensive range of KP resources and implementation supports as our type A example, but differing from the type A example by being readily communicable and having a clear relative advantage over existing practice. A well designed array of interrelated teaching machines and programmed instructional materials might fall into this category if available at a low cost.

Type B output management requires the same kinds of KPU resources and management strategies described above for type A -- assembling, organizing, and coordinating an extensive array of resources, developing collaborative relationships among various subcontractors, and developing a wide range of intensive implementation supports. Type B differs only in requiring less attention to the set of evaluation, packaging, and dissemination activities directed at overcoming the relative advantage and communicability barriers that characterize type A but not type B outputs.

A type A product might be shifted into the type B category if certain conditions were met in the design of the product. For instance, if an instructional system was conceptualized and designed with narrowly specified performance objectives and frequent diagnostic [illegible]ctive interventions, student gains would in all likelihood become more visible, and the communicability and relative advantage problems inherent in the initial conception of the innovation might be overcome.

C. Products with High Inherent KP Requirements and Moderate KU-Oriented KP Requirements Because of Attributes that Pose Difficulties for Adoption But Not Implementation

An example of a type C output might be development of a series of extraordinary films relating human functioning -- biological, psychological, sociological, and ecological -- to similar patterns in other species of the animal kingdom. The films might require assembling expensive talent and equipment, and costly filming in remote locations of the world or inside the human body with expensive equipment. Though easy to implement, serious barriers to adoption might be raised in some communities because of the basic conception of the films -- likening human and animal behavior, considering evolution, showing reproductive and other functions still controversial in public education.

Products of this kind might be managed more effectively if the kinds of adoption problems they are likely to pose are thought through during the conceptualization and development of the product itself. Packaging and promotional activity after the product is fully developed are likely to have limited effectiveness in overcoming these barriers. Given the extensive KP requirements of this type of innovation and therefore the high KP costs to be expected, adoption planning can be absorbed without undue strain if these activities are planned at the outset. This is especially true since implementation problems are minimal or even nonexistent and therefore place no additional strain on available KP resources.

D. Products with High Inherent KP Requirements But Attributes that Pose No Difficulties for Either Adoption or Implementation

An example of a type D innovation might be a series of films or printed materials similar in quality and scope to our type C example, but having no inherently controversial subject matter or other attributes that would pose adoption barriers. The materials would simply be used as additions to existing materials, or would perhaps replace a textbook chapter or a set of teacher-made materials of lesser quality. At most, the new materials might require some new lesson plans, but certainly no significant change in practices or instructional strategies. The materials might be as costly to develop as those in our type C example, but wide scale adoption and implementation would likely permit low unit costs to adopting school systems. Given this combination of attributes, effective KP management of a type D product would call for carefully controlled development and production costs and broad-based marketing and promotion to permit pricing for mass distribution.

E. Products with Low Inherent KP Requirements But High KPO Requirements Because of Attributes that Pose Difficulties for Both Adoption and Implementation

Type E can be illustrated by a training program to increase racial sensitivity and improve intergroup relations in racially tense school districts. Training programs of this kind can be developed at little cost by as few as one or two specialists. KP requirements are minimal. The difficulty is persuading school systems to adopt such threatening programs, with unclear advantages, and unclear effects of any kind, likely to threaten existing sensitivities, practices, etc. With such programs, even if adoption problems are overcome (perhaps with the incentive of ESAA funding or under the pressure of a court order), implementation problems are likely to be enormous, especially if implementation is defined as not simply providing training in workshops but also carrying it into, and monitoring effects in, classrooms and administrative offices.

Programs of this kind are rarely effective. We would argue that part of the problem is attributable to the way they are managed. Development costs tend to be used as the yardstick for determining total allocations for such programs. Since development costs are low, little money is available to overcome the program's substantial KU requirements. This suggests the need for management strategies for type E products that either redefine the appropriation yardstick to consider KU as well as KP costs, or that plan for KU requirements as part of KP development work and KP development costs.

F. Products with Low Inherent KP Requirements and Moderate KPU Requirements Because of Attributes that Pose Difficulties for Implementation But Not Adoption

Team teaching, ungraded classrooms, and open education are examples of innovations that have low KP requirements and are readily adopted, but are difficult to implement. These are the "idea" innovations that are rarely "developed" in the R&D sense, even more rarely "packaged" for utilization, but become popular and spread as fads. Because there is so little development and packaging, the idea means different things to different people and is implemented quite differently from place to place -- often emasculated into "more of the same old thing." Implementation problems tend to be considerable -- both because there is so little development and packaging, and because these ideas tend to be incompatible with conventional practice and with strongly held views about what schools should look like and how they should function.

Effective KPU management of type F innovations would seem to require focusing on the implementation process. Essentially what we have in mind is developing and packaging these "idea" innovations -- researching, developing, evaluating, and packaging these approaches and strategies in a manner that provides a range of supports to facilitate their implementation. Such packaging might include print and media descriptions of these innovations in operation, detailed how-to-do-it guides, evaluation checklists, training programs for school personnel, and too, ideally, provision of implementation specialists in technical assistance teams. Appropriating significant sums to this kind of implementation-oriented development is uncommon in education, though not unknown. If educational practice is to be significantly affected by idea innovations, it seems to us that type F innovations will require this kind of KPU management focus.

Systematic development of idea innovations would also seem essential to serve another purpose -- reducing the faddish nature of the acquisition process for type F innovations. The development function generates extensive amounts of evaluation data that can provide acquisition personnel with comparative information on competing strategies or variations on a single type of innovation. Once comparative evaluation information is widely available, the acquisition function is less likely to be subject to fads and more likely to be influenced by data on product effectiveness.

G. Products with Low Inherent KP Requirements and Moderate KPU Requirements Due to Attributes that Pose Difficulties for Adoption But Not Implementation

A classic type G innovation would be a new unit or course on a controversial subject such as sex education. Development of the course or unit would probably be inexpensive and require few KP resources. Implementation would be relatively easy. Adoption barriers, however, might be considerable in a conservative community with strong reservations about the propriety of the subject matter for public education.

Effective KPU management of an innovation of this kind might require extensive attention to adoption (i.e., marketing) problems. Ideally, we would envision developers working with marketing personnel to predetermine the segments of the overall market to be reached by this product, to accommodate the product's design to the likely concerns of these different segments (wherever possible without impairing the product's integrity), and to design differentiated marketing strategies targetted at these different segments of the overall market. Integrated product and marketing planning of this kind is relatively rare in educational R/D&I, but it is especially rare with products that require such low KP investments. Appending an expensive marketing apparatus to innovations with low KP costs would seem difficult to justify. Therefore, this set of conditions suggests the need for a specialized marketing apparatus able to handle large numbers of such products, reducing the per product and per unit costs of the marketing operation. An organization of this kind might be public, quasi-public, or private, subsidized or self-supporting, or perhaps changing in status over time. But clearly, type G outputs will need some such marketing support if they are ever to be diffused widely.

H. Products with Low Inherent KP Requirements and Low KPU Requirements Due to Attributes that Pose No Difficulties for Either Adoption or Implementation

Most conventional learning materials are of this type. They are relatively simple and therefore require few resources for development or production. They can be used easily in any classroom, without requiring any new learning or conflicting with existing practice. They are uncontroversial, and therefore pose few barriers to adoption. Their effects may not be known in advance, but that is equally true of competing sets of materials on the market. There may be no hard evaluation data to prove the relative advantage of this set of materials over another, but the adopter perceives them to be better.

Educational products of this type are the least costly and easiest to develop and disseminate. But so many products of this type are available on the market, and so little comparative evaluation information is available about them, that the educational marketplace is rather chaotic and acquisition processes are somewhat random. If this situation is to be remedied, a mechanism is needed to acquire and disseminate uniform descriptive and evaluative information on comparable outputs. We gave some attention to this matter in our chapter on the acquisition function.

I. Summary

We have considered eight combinations of product attributes that seem significant enough in their impact on KPU processes to require different overall KPU management strategies. Within each of these eight product types, we can envision subcategories by differentiating patterns within each of our three basic analytical dimensions -- different combination of KP resources to be assembled and organized, different types of adoption and/or implementation problems to be overcome, etc. Just as the eight basic categories suggested differences in overall KPU management strategies, each of these subcategories would suggest differences in management requirements -- e.g., differences in management strategies for hardware vs. software innovations, or for different personnel skill mixes, or for different organizational arrangements, etc. The complexity could be carried to a considerable degree with greater and greater specificity of combinations. However, this analysis was not undertaken to generate this kind of complex typology. Rather, we were concerned with suggesting the kind of typology we see as useful. The intent of our approach has been: (1) to suggest how important it is to analyze a product's KP and KU attributes and requirements at the outset of R/D&I decision making on a given project and to integrate KU planning into KP activities; and (2) to emphasize the need for adequate allocation of resources to both KP and KU requirements throughout a product's conception-to-institutionalization life cycle.

VIII. CONCLUSIONS

Our analysis in this chapter has focused on the outputs produced by the educational R/D&I system in this country. We have noted that some high quality outputs have been identified and some of these are widely used, and that in addition there have been many significant bodies of research that have had a substantial impact on the improvement of educational practice. However, we have also considered the generally "mediocre" rating given to most of the research and most of the development work that have been carried out, and we have suggested several kinds of steps we see as needed to improve output quality.

Before these steps can be taken, however, a considerable amount of conceptual work would seem to be called for as a basis for designing the kind of data base and monitoring system we believe to be essential to assist policymakers in formualting and assessing policy initiatives to improve system functioning and raise output quality. And with that, we have called for a substantial amount of data-gathering and analysis, especially process analyses of quality functioning and creative observational analyses of the practice setting for which development outputs in particular are being designed.

We have tried to suggest the kinds of thinking we see as needed and the kinds of research we believe needs to be supported. However, we see very little evidence at this time that the sponsors of educational R/D&I activity appreciate the systemic requirements for improving quality and therefore the significance of developing the suggested data base and monitoring system to inform policymaking on these matters. Clearly, there are a number of reasonable approaches to improving output quality, and developing a data base on outputs may well seem too indirect and long-term an approach to meeting that need. However, the more direct approaches supported over the last two decades do not seem to have had a sufficiently powerful effect on output quality, and we seem to know as little now about the specific requirements for quality work of each type as we knew a decade or two ago. The reason, we would argue, is that we have not made the effort to increase our understanding of the R/D&I processes that are carried out to produce outputs or the system of performers who carry them out. Until we develop a better understanding of those processes and their requirements in the settings where they are carried out, we will be in no better position to fashion effective policies to improve output quality and thereby produce significant improvement in educational practice.

Footnotes

1. H. Del Schalock, Gregory P. Thomas, Kevin A. Morse, Clark A. Smith, Harry L. Ammerman, The Oregon Studies in Educational Research, Development, Diffusion, and Evaluation, Volume I: Summary Report (also see Volumes II-V) (Monmouth, Oregon: Teaching Research Division, Oregon State System of Higher Education, 1972).

2. Intermediate outputs are not a separate category in the Oregon Studies scheme. Rather, they include these among others in their broad "products" output category.

3. Schalock et al., Oregon Studies: Volume I, op. cit., p. 104.

4. Ibid.

5. Office of Education, Educational Research and Development in the United States (Washington, D.C.: U.S. Government Printing Office, 1969).

6. National Institute of Education, 1976 Databook: The Status of Education Research and Development in the United States (Washington: NIE, 1976).

7. Virtually all of the layer research organizations (and many of the smaller ones as well) print and distribute pamphlets, brochures, or other forms of publication lists enumerating the various published and/or unpublished research reports, articles, monographs, etc., produced by their staff. Illustrative of the range of organizations, we note some few of the organizations whose lists of publications we have seen recently: The University of Michigan's Institute for Social Research, (and within the ISR) The Center for Research on the Utilization of Scientific Information, The Bureau of Social Science Research, Abt Associates, The Center for New Schools, and The Institute for Responsive Education.

8. Council for Educational Development and Research (CEDaR), CEDaR Catalog of Selected Educational Research and Development Programs and Products (Denver: CEDaR, 1972).

9. National Institute of Education, Catalog of NIE Education Products (Washington: NIE, 1976).

10. D. W. Kratochvil et al., Product Development Reports (Palo Alto: American Institutes for Research, 1972); also see: S. N. Henrie, (ed.) ALERT: A Sourcebook of Elementary Curricula Programs and Projects (San Francisco: Far West Laboratory for Educational

Research and Development, 1972); and Brenda J. Turnbull et al., Promoting Change in Schools: A Diffusion Casebook (San Francisco: Far West Laboratory for Educational Research and Development, 1974).

11. For instance, see: J. I. Smith and Mary F. McCord (eds.) ERIC Information in Analysis Products 1967-1972 (Washington: ERIC Clearinghouse on Library and Information Sciences, 1973) ED 078 862; Mary F. McCord (ed.) ERIC Products 1970-1971: An Annotated Bibliography of Information Analysis Publications of the ERIC Clearinghouse, July 1970 through June 1971 (Washington: ERIC Clearinghouse on Library and Information Sciences, 1971) ED 054 827.

12. Educational Products Information Exchange, New York City.

13. Mortimer Smith, Richard Peck, and George Weber, A Consumer's Guide to Educational Innovations (Washington: Council for Basic Education, 1972).

14. Fred N. Kerlinger (ed.) Review of Research in Education: Volume I (Itasca, Illinois: F. E. Peacock, 1973); Fred N. Kerlinger and John B. Carroll (eds.) Review of Research in Education: Volume II (Itasca, Illinois: F. E. Peacock, 1974); Fred N. Kerlinger (ed.) Review of Research in Education: Volume III (Itasca, Illinois: F. E. Peacock, 1975); Lee S. Schulmany (ed.) Review of Research in Education: Volume IV (Itasca, Illinois: F. E. Peacock, 1976); and Lee S. Schulman (ed.) Review of Research in Education: Volume V (Itasca, Illinois: F. E. Peacock, 1977).

15. N. L. Gage (ed.) Handbook of Research on Teaching (Chicago: Rand McNally, 1963); Robert M. W. Travers (ed.) The Second Handbook of Research on Teaching (Chicago: Rand McNally, 1973).

16. The most recent of these multi-volume sets is the fourth edition, R. L. Ebel (ed.) Encyclopedia of Educational Research 4th ed. (New York: Macmillan, 1969).

17. Prior to the RER policy change, this quarterly published only brief commissioned reviews on a series of standard topics focused largely on educational practice (e.g.: curriculum, guidance, administration, testing, school organization). The topics were rotated so that every few years the same topic reappeared (e.g.: a full issue on curriculum, with separate reviews on each subject matter field), reviewed significant research and other developments that appeared since the last review, and may also have

17. (cont'd) provided an integrative status report on the state of knowledge on that topic at the time. The RER was subjected to a good deal of criticism by researchers for failing to provide much of a sense of what was happening in the live research areas of the field. This change in AERA policy has transformed the RER into a journal oriented primarily to researchers and to KP concerns rather than practitioners and KU concerns.

18. For instance, 12 journal abstractory and indexing services relevant to educational research are listed in Carnot E. Nelson, "Abstract and Information Retrieval Services in Educational Research: Current Status and Planned Improvement," Educational Researcher, Vol. 3, No. 10, November 1974. Nelson lists Psychological Abstracts, Mental Retardation Abstracts, Exceptional Child Abstracts, dsh Abstracts, College Student Personnel Abstracts, Child Development Abstracts and Bibliography, Educational Administration Abstracts, Sociology of Education Abstracts, Language and Language Behavior Abstracts, Current Index to Journals in Education, Educational Index, and Current Contents in Social and Behavioral Sciences. In addition, there are services which abstract research in progress and/or the fugitive literature (e.g.: The Smithsonian Institution Scientific Information Exchange or ERIC's Research in Progress).

19. For instance, see: Gene V. Glass (ed.) Evaluation Studies: Review Annual, Volume 1 (Beverly Hills: Sage Publications, 1976); Marcia Guttentag (ed.), Evaluation Studies: Review Annual, Volume 2 (Beverly Hills: Sage Publications, 1977); Thomas D. Cook (ed) Evaluation Studies: Review Annual, Volume 3 (Beverly Hills: Sage Publications, 1978 forthcoming).

20. Caroline H. Persell. The Quality of Research on Education: An Empirical Study of Researchers and Their Work, New York, Bureau of Applied Social Research, Columbia University 1971.

21. For instance, see: Lee J. Cronback and Patrick Suppes (eds.) Research for Tomorrow's Schools: Disciplined Inquiry For Education (New York: Macmillan, 1969), pp. 158-159, 232,269; Michael Seriven. "The Philosophy of Science in Educational Research," Review of Educational Research, Vol. 30, 1960; N. A. Fattu. A Survey of Educational Research and an Appraisal by Scientists from Other Fields (Bloomington, Indiana: School of Education, Indiana University, 1967); Ronald G. Corwin and Maynard Seider. "Patterns of Educational Research: Reflections on Some General Issues." In Richard Dershimer (ed.) The Educational Research Community: Its Communication and Social Structure (Washington: AERA, 1970), ED 057 275; National Academy of Sciences, Fundamental Research and the Process of Education,

21. (cont'd) Final Report of the Committee on Fundamental Research Relevant to Education, Sara B. Kiesler and Charles F. Turner (eds.) (Washington: National Academy of Sciences, 1977). Also see the Phi Delta Kappa symposia on educational research: F. W. Banghart (ed.) First Annual Phi Delta Kappa Symposium on Educational Research (Bloomington, Indiana: Phi Delta Kappa, 1960); R. C. Collier, Jr. and S. M. Elam (eds.) Second Annual Phi Delta Kappa Symposium on Educational Research: Research Design and Analysis (Bloomington, Indiana: Phi Delta Kappa, 1961); E. Guba and S. Elam (eds.) Sixth Annual Phi Delta Kappa Symposium on Educational Research: The Training and Nurture of Educational Researchers (Bloomington, Indiana: Phi Delta Kappa, 1965).

22. Benjamin S. Bloom. Twenty-Five Years of Educational Research." American Educational Research Journal, Vol. 3, No. 1, May 1966.

23. Edwin Wandt, Georgia S. Adams, Dorothy M. Collett, William B. Michael, David G. Ryans, and Carleton B. Shay. "An Evaluation of Educational Research Published in Journals." Report of the Committee on Evaluation of Research (Washington: American Educational Research Association, 1967); Edwin Wandt. A Cross-Section of Educational Research (New York: David McKay Co., 1965); Annie W. Ward, Bruce W. Hall and Charles F. Schramm. "Evaluation of Published Educational Research: A National Survey." American Educational Research Journal, Vol. 12, No. 2, Spring 1975, pp. 109-128; Persell, op. cit.

24. Edward L. Vockell and William Asher. "Perceptions of Document Quality and Use by Educational Decision Makers and Researchers." American Educational Research Journal, Vol. 11, No. 3, Summer 1974, pp. 249-258.

25. For instance, panels of expert judges were used in Wandt et al., op. cit.; Vockell and Asher, op. cit.; Ward, Hall, and Schramon, op. cit.; and Persell, op. cit. Judges in the Ward, Hall, and Schramon study were selected using a process that began with a random selection of members from AERA's Division D.

26. Cronbach and Suppes, op. cit.

27. National Academy of Sciences, op. cit.

28. J. W. Getzels. "Paradigm and Practice: On the Contributions of Research to Education." Mimeographed, as cited in Office of Education, Educational Research and Development in the United States, op. cit., pp. 139-140.

29. Office of Education, Educational Research and Development in the United States, op. cit., pp. 177-184.

30. Daniel E. Griffiths, "The Ten Most Significant Educational Research Findings in the Past Ten Years," Executive Action Letter Translating Research into Action, Vol. 6, May 1967, as reprinted in Oregon Studies, op. cit., Vol. II.

31. For instance, see descriptions of existing capabilities in various states (New York State is one good example) included in N[illegible]P for Evaluation of State Capacity Building Program in Dissemination (Washington: NIE, 1976).

32. For instance, see John A. Emrick, with Susan M. Peterson and Rekha Agarwala-Rogers, Evaluation of the National Diffusion Network, Vol. I: Findings and Recommendations (Menlo Park: Stanford Research Institute, 1977); also see the USOE publication series entitled It Works; and a compendium of exemplary programs compiled by one SEA, published as Phyllis A. MacAdam and Elisabeth Fuller, eds., "ESEA Title III Projects" in a special issue of Kaleidoscope 2 - A Descriptive Collection of Promising Educational Practices (Boston: Department of Education, Commonwealth of Mass., 1970).

33. Kratochvil et al., op. cit.; Turnbull et al., op. cit.

34. Ibid.

35. B. J. Fallon, ed., Educational Innovation in the United States (Bloomington, Ind.: Phi Delta Kappa, 1966); J. Lindeman, S. K. Bailey, J. S. Berke, and L. H. Naum, Some Aspects of Educational Research and Development in the United States -- Report for the OECD Review (Syracuse: Syracuse University Research Corporation, 1968); OE, Educational Research and Development in the United States, op. cit.; R. Havelock and M. Havelock, Educational Innovation in the United States (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1973); Margaret Nelson and Sam D. Sieber Innovations in Urban Secondary Schools (New York: Bureau of Applied Social Research, Columbia University, 1975).

36. NIE, Catalog of NIE Education Products, op. cit.; NIE 1976 Databook, op. cit., pp. 55-56.

37. See our chapters on the dissemination and implementation/utilization functions and on information flows.

38. Of particular importance is the classic by Everett K. Rogers, Diffusion of Innovations (New York: The Free Press, 1962).

39. OE, Educational Research and Development in the United States, op. cit., pp. 126-137.

40. Persell. op. cit.; reproduced in NIE, 1976 Databook, op. cit., p. 56.

41. NIE, ERIC Description Usage Report (New York: CCM Information Corp., 1973), reproduced in NIE, 1976 Databook, op. cit., p. 60.

42. NIE, Catalog of NIE Education Products, op. cit.

43. Ward S. Mason, Carnot E. Nelson, and William M. Somers, Federal Funding for Education Knowledge Production and Utilization. KPU Function, By Agency (Washington: National Institute of Education, 1977).

44. See our chapter on the Development function.

45. See sources cited above in footnote 21. Also, Bloom, W. B. Michael, "Teacher Personnel: A Brief Evaluation of the Research Reviewed," Review of Educational Research, Vol. 33, 1963; Ralph W. Tyler, "Analysis of Strengths and Weaknesses in Current Research in Science Education," as reprinted in Oregon Studies, Vol. II, op. cit.; and two of the articles in particular in Guba and Elam, The Training and Nurture of Educational Researchers, op. cit.: Bereiter, "Issues and Dilemmas in Developing Training Programs for Educational Researchers," p. 99, and Egon G. Guba, "An Overview of the Symposium," p. 276.

46. Cronback and Suppes, op. cit., pp. 158-159.

47. Ibid., p. 226.

48. Scriven, op. cit.

49. Bloom, op. cit.

50. Wandt et al., op. cit.

51. Ward, Hall and Schramm, op. cit. It should be noted that the two studies are not totally comparable, and differences in the later research are noted by the authors.

52. Persell, op. cit.

53. Vockell and Asher, op. cit.

54. The most significant of the studies using citation rates is: Stephen Cole and Jonathan R. Cole, "Scientific Output and Recognition: A Study of the Operation of the Reward System in Science," American Sociological Review, Vol. 32, June 1967, pp. 377-390.

55. Persell, op. cit.

56. Ibid., pp. 58-59.

57. As illustrative of the disagreements noted in point (d), Vockell and Asher, op. cit.

58. Bruce B. Bartos, "A Review of Instruments Developed to be Used in the Evaluation of the Adequacy of Reported Research," (Bloomington, Ind.: PDK, 1969), Mineographed, as cited in Persell, op. cit., p. 66.

59. For instance, see: E. A. Drorak, "General Guide to a Study of Research Reports," Peabody Journal of Education, Vol. 34, 1956, pp. 141-144; W. W. Farquhar and J. D. Krumboltz, "A Checklist for Evaluating Experimental Research in Psychology and Education," Journal of Educational Research, Vol. 52, 1959, pp. 353-354; G. B. Johnson, "A Method for Evaluating Research Articles in Education," Vol. 51, 1957, pp. 149-151; R. L. Kohr and M. N. Suydam, "An Instrument for Evaluating Survey Research," Journal of Educational Research, Vol. 64, 1970, pp. 78-85; S. Strauss, "Guidelines for Analysis of Research Reports," Journal of Educational Research, Vol. 63, 1969, pp. 165-169; P. M. Symond, "A Research Checklist in Educational Psychology," Journal of Educational Psychology, Vol. 47, 1956, pp. 100-109; D. B. VanDalen, "A Research Checklist in Education," Educational Administration and Supervision, Vol. 44, 1958, pp. 174-178; William J. Gephart, Development of an Instrument for Evaluating Reports of Educational Research, (Washington: U.S. O.E. Cooperative Research Project Number S-014, 1964); and William J. Gephart, "Criteria for Methodological Adequacy for Research on Educational Change," in Oregon Studies, op. cit., Volume II: Selected Literature, p. 51-71.

60. For instance, Wandt et al., op. cit.; Gephart, Development of an Instrument, op. cit.; Nasatir, cited in Pensell, op. cit.; and Caroline Hodges (Persell), "Mesauring Educational Research Quality and Its Correlates," Unpublished Master's Essay (New York: Columbia University, 1967).

61. Wandt, et al., op. cit.

62. Persell, op. cit.

63. Ibid., p. 114, is just one example of this point.

64. Getzels, op. cit.

65. Griffiths, op. cit.

66. Cronbach and Suppes, op. cit.

67. National Academy of Sciences, op. cit.

68. OE, Educational Research and Development in the United States, op. cit., pp. 177-184.

69. For instance, see Cronbach and Suppes, op. cit.; Griffiths, op. cit., and Getzels, op. cit. Also see Fred N. Kerlinger, "The Influence of Research on Education Practice," Presidential Address, AERA Annual Meeting, April 1977, Reprinted in Educational Researcher, Vol. 6, No. 8, September 1977.

70. Griffiths, op. cit.

71. For instance, see Office of Education, Educational Research and Development in the United States, op. cit., pp. 146-153 for the findings of a special survey commissioned by OE by this 1969 Educational R&D status report. The survey was conducted by the Bureau of Social Science Research through the Policy Institute of the Syracuse University Research Corporation. The findings were reported in John Lindeman et al, Some Aspects of Educational Research and Development in the United States: Report for the OECD Review. Final Report (Syracuse: Syracuse University Research Corporation, 1969) ED 048 135.

72. See our chapter on the development function in educational R/D&I in this volume. Also see Michael Radnor, Harriet Spivak, Durward Hofler, Earl C. Young, Agency/Field Relationships in the Educational R/D&I System: A Policy Analysis for the National Institute of Education (Evanston: CISST, Northwestern University, 1976); and Michael Radnor, Harriet Spivak and Durward Hofler, Research, Development and Innovation: Contextual Analysis (Evanston: CISST, Northwestern University, 1977).

73. The definition of development in terms of rigorous and systematic procedures in the R&D tradition is found in both the 1969 OE Status Report (Educational Research and Development in the United States) and the 1976 NIE Databook. Yet clearly, NIE has also moved toward the KPU usage and toward support for building internal capabilities. The accepted usage, then, still differs from our own, and these operating system development activities are generally not described in most other sources as "development".

74. OE, Educational Research and Development in the United States, op. cit., pp. 144-145.

75. Kratochvil et al., Product Development Reports, op. cit.; and Turnbull, et al., Promoting Change in Schools, op. cit. Also see J. J. Crawford, D. W. Kratochvil, and C. E. Wright, Evaluation of the Impact of Educational R&D Products, Final Report (Palo Alto: American Institute for Research in the Behavioral Sciences, 1972).

76. NIE, 1976 Databook, op. cit, pp. 52-55.

77. For instance, MacAdam and Fuller, Kaleidoscope 2, op. cit.

78. OE Memorandum to Superintendents, February 11, 1974, as quoted in Emrick et al., Evaluation of the National Diffusion Network, op. cit.

79. Ibid. Also see the September 1975 National Diffusion Network Program catalog entitled Educational Programs That Work.

80. NIE, 1976 Databook, op. cit.

81. Nelson and Sieber, Innovations in Urban Secondary Schools, op. cit.

82. Ibid. The quality ratings of only 3 of the 17 innovations included in the study had a standard deviation of 1.0 or more on a scale of 1 to 5.

83. Ibid. Nelson and Sieber report the Spearman rank order correlation between these two variables as .34.

84. Ibid.

85. For instance, see Rogers, Diffusion of Innovations, op. cit.; John Pincus, "Incentives for Innovation in the Public Schools," Review of Educational Research, Vol. 44, No. 1, Winter 1974; Henry M. Brickell, Organizing New York State for Educational Change (Albany: New York State Department of Education, 1961); Willard Jones, "The Nature and Process of Educational Development," in The Oregon Studies, Vol. II, op. cit. Also see Gerald Zaltman and Nan Lin, "On the Nature of Innovations," American Behavioral Scientist, Vol. 14, 1971.

86. Rogers, Diffusion of Innovations, op.cit.

87. See our chapter on the acquisition function in educational R/D&I, and also National Institute of Education, A Concept Paper for the School Practice and Service Division (Washington: NIE, 1975).

88. Pincus, "Incentives for Innovation in the Public Schools," op. cit., For a contrary perspective on the effect of costs, see Nelson and Sieber, Innovations in Urban Secondary Schools, op. cit.

89. See our chapter on the development function in educational R/D&I.

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER NINE

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CHAPTER NINE

NEED IDENTIFICATION IN EDUCATION

NEED IDENTIFICATION IN EDUCATION

Subsumed under need identification are all processes of perception, conceptualization, articulation, screening, and decisionmaking that lead to the determination of what needs the R/D&I system (and/or particular R/D&I institutions) will attempt to meet -- what research questions will be studied; what products will be developed; what organizational strategies or change processes will be designed; what existing R/D&I products will be adopted or adapted by a user system; etc. Included is need identification as it occurs in sponsor organizations (e.g., NIE, OE, or foundations) or in performer organizations (e.g., universities, regional laboratories, or non-profit R/D&I firms), institutions at the knowledge-producing or the knowledge-utilizing end of the KPU spectrum. The need identification process may be the stimulus for R&D activities oriented to developing new products (or processes or strategies), or for the search-acquisition-adaptation-implementation cycle that brings existing products into use in new settings, or for various kinds of problem-solving or practice-based development activities within schools or other parts of the operating system (e.g., district offices, SEAs, IEAs, etc.).

Of all the dimensions on which R/D&I systems could be compared from sector to sector, need identification processes suggest, perhaps more than any other feature, the degree of integration that exists between KP and KU functions. Where need identification processes are operating well: (1) R&D products are geared to needs of the user system that are real and are perceived as such by user system personnel; (2) R&D outputs are designed initially, or adapted later, in a manner that takes into account the attributes, and especially the constraints, of user systems, and the working types, preferences, and sensitivities of user system personnel; (3) responsiveness to user system attributes in the need identification function spills over into the manner in which other R/D&I functions are carried out -- how knowledge is generated, how products are developed, how they are evaluated, disseminated, or marketed, how they are installed, and especially what implementation supports are provided. Consequently, the problems of user system adoption/adaption, implementation, and utilization of development products are minimized.

There has been much criticism of need identification processes in educational R/D&I, and some of this has appeared in the literature. Much of the discussion in the literature is phrased in the most general terms -- bemoaning the "research to practice gap" and the irrelevance of most educational research to educational practice, or the difficulties of getting school systems to adopt R&D outputs presumably designed to meet their needs, or the "faddishness" of much educational innovation. Some of the literature more specifically pinpoints characteristics of need identification processes in edu a-tion as a major cause of these gaps, and therefore of the limited impact of R&D outputs on educational practice.[1]

Our analysis suggests that need identification processes in education show few of the attributes of need identification in mature R/D&I systems. If we are to develop feasible policy options and management strategies to remedy this situation, we must develop an understanding of several things: first, how needs are identified in education; second, how this compares to need identification as this takes place more effectively in other sectors; third, what issues this suggests in developing policy options and management strategies for restructuring and changing the manner in which need identification occurs; fourth, how the educational context affects the desirability and feasibility of certain options and strategies; and finally, what more we need to know before we can design workable policies and management strategies for need identification in education. The analysis that follows considers each of these points.

I. HOW NEEDS ARE IDENTIFIED IN EDUCATION

Several patterns of need identification in education can be distinguished, varying along four dimensions: who identifies the need; the basis for the perception of need; the extent to which needs are translated into innovation requirements; and the nature of the decisionmaking mechanisms used to screen alternatives and make need identification decisions for a system.

1. Who Identifies the Need -- External or Internal Need Identifiers?

A. External Need Identifiers

Given the strong influence of environmental forces on educational institutions (both operating systems and R/D&I institutions), it should not be surprising that a significant number of the most pressing needs to which these institutions respond are identified by organizations, institutions, and individuals in that environment. Examples of external need identifiers abound. The courts, for instance, have mandated school desegregation and the development of programs to ease the effects of that desegregation. The courts have also mandated the provision of bilingual education in districts where large numbers of students are unable to comprehend the English language at a level adequate to derive benefit from their schooling. The effect has been the need to develop instructional programs for students whose primary language is Spanish, Italian, Greek, French, or Chinese. To take another example, Congress has identified compensatory education for disadvantaged students as a high priority need, and the provision of large sums of Title I funds for such programs has had a major impact on the activities of both educational R/D&I and operating systems.

Nongovernmental examples of need identification in the broader environment could be cited as well -- the civil rights movement's concern with black pride and black students' self-images, leading to the identification of needs to revise textbooks and course content and even provide specialized new courses and totally new kinds of materials; similar patterns of need identification influencing textbook and materials development for programs targetted at Hispanic-Americans, Native Americans, and other ethnic groups; and the most recent ripple in this pattern, the identification of sexism in textbooks and educational materials as a problem requiring responses from the R/D&I and operating systems.

In all these examples, the locus of the need identification process is in the broader environment of the educational R/D&I and operating systems. The needs so identified are communicated from the environment through court mandates and the power to force compliance, through legislation making available large sums of money to entice responsive program development, or through pressure group tactics or efforts at moral suasion that are difficult for school systems to resist.

B. <u>Internal Need Identifiers</u>

Several other patterns of need identification can be traced to origins <u>within</u> the R/D&I or operating systems. The loci of need identification in these instances are: researchers, developers, R&D entrepreneurs, R/D&I sponsors, and R/D&I institutions, policymakers and administrators at the federal, state, and local levels of the operating system; teachers and other operating system personnel who interact directly with students; and school boards and their parent and community constituencies. We consider examples of the functioning of these need identifiers below.

2. What Are the Bases of Need Perception -- Data, Intuition, or Opportunism?

A. Data-based Need Identification

We use the term data-based to describe the processes that lead to the identification of a need following, and as a consequence of, analysis of a body of empirical data. Specifically excluded from this category are needs identified by various intuitive, political, and other means, and then justified by reference to data assembled after the fact. Two kinds of data-based need identification can be distinguished: (1) systematic, ongoing analysis of routinely collected data, cyclically reviewed as part of an institutionalized need identification function; and (2) one-time analyses of particular pieces or bodies of data collected primarily for some other purpose, but used on an ad hoc basis to identify a particular need or set of needs.

a. Systematic, Ongoing Analysis of Routinely Collected Data Bases

With increased application of the technology of management information systems to the education sector, we are beginning to see the emergence of planning toward the development of SEA or LEA management information systems. Such systems are expected to be geared specifically to identifying needs and managing activities related to the development, implementation, and evaluation of programs designed to meet those needs. Suggestions of this pattern can be discerned in national and state assessment projects, in work on the development of social indicators applicable to education, and in contract work to assist LEAs in designing, installing, and utilizing management information systems to meet their needs.[2]

Where this pattern of data-based need identification is operative (and it may not yet be fully operational anywhere at this time), needs are identified on a periodic, cyclical basis as part of the routinized processes of system functioning. Needs are identified by comparing certain prespecified performance goals with current data on the degree to which the system is achieveing these goals. The loci of need identification of this kind tend to be policy-makers and administrators at the federal, state, or local levels of operating systems that have such data bases and systematic need identification mechanisms available to them. Only occasionally might researchers or R/D&I institutions be the locus of this kind of need identification, where they have been given access to these data bases and are functioning either on their own or in collaboration with operating system personnel.

b. <u>Findings of Research - Single Studies, Research Programs, or Reassessments of Bodies of Research Leading to New Theoretical Paradigms</u>

Research studies generally conclude by pointing to further research that needs to be done to pursue leads uncovered in a particular investigation, or to untangle questions left unanswered, or to deal with contingencies outside the scope of a particular design. Or, research findings may pinpoint, elaborate on, or uncover hitherto unnoticed problems in need of solution through R/D&I processes. On occasion, large research programs may be designed and carried out in a manner that identifies the parameters of the needed solution to a problem, perhaps even specifications for a product or an organizational strategy or an instructional system to be developed.

And rarest of all, reassessments and syntheses of bodies of research may lead to wholly new theoretical paradigms and wholly new definitions of needs to be met or programs to be developed. Certainly much of the educational R/D&I activity of the last decade that was focused on compensatory and preschool education is traceable to the development and popularizing of new paradigms. One kind of compensatory education program development followed from the delineation of a paradigm of disadvantage, deprivation, or deficit. A somewhat different kind of compensatory education programming evolved from a revisionist paradigm emphasizing cultural difference rather than deficit. One theoretical paradigm stimulated identification of the preschool age period of 3 - 5 as a key target of R/D&I activities. A newer paradigm is suggesting that the target age should be lowered to perhaps the period from birth to age 2.

We noted earlier that ongoing, systematic analysis of routinely collected data as part of an institutionalized need identification function, if it exists at all, primarily affects need identification as this is carried out by policymakers and administrators in SEAs and LEAs who have developed and are utilizing such management information systems. In sharp contrast, the research findings and theoretical paradigms we have considered in this section are a major, and perhaps <u>the</u> major, basis of need identification as this takes place among researchers and in some R/D&I institutions. To some extent, too, these research findings and paradigms affect need identification as it takes place among policymakers at the federal level (or in foundations) as they formulate funding programs for R/D&I activities they will support. This is especially so in cases where research findings or paradigms get popularized and affect the broad currents of social thought, or reinforce a significant social and/or political movement in the broader environment of the R/D&I and operating systems. (This is well illustrated by the compensatory education example.)

B. Intuitive Need Identification

We have no way of knowing or even estimating the proportion of all need identification in education that is data-based. However, there is ample testimony in the literature to the preponderant influence of experience, analysis, expert opinion, and various forms of intuition in determining educational needs in the operating system, and some reason to suspect that much the same is true of need identification in R/D&I organizations as well. Three patterns of intuitive need identification can be distinguished: (1) need identification by spontaneous insight; (2) need identification by polling; and (3) need identification by comparison.

a. Spontaneous Insight

We include in this category all need identification that can be traced to an a-ha! phenomenon at its true inception. The creative teacher or administrator senses a problem, thinks about how to remedy it, and decides that she needs to develop a certain kind of instructional strategy, or a certain set of materials, or a particular kind of program or policy, or that she needs to find answers to a certain set of questions before she can proceed further. A creative researcher ponders over a certain situation that he finds problematic, and generates a series of research questions that he feels must be answered before a feasible solution to the problem can be found. A research or R/D&I entrepreneur or sponsor needs a project or an approach to which he feels he can commit himself, his organization, and his resources. He muses, and he is struck by an idea that satisfies and perhaps even excites him.

b. Polling

A funding source has money to spend and asks experts in the field to suggest what needs to be done and what R/D&I activities should be supported. An R/D&I organization is approaching the beginning of a new funding cycle and needs ideas for a program that can attract funds. The staff of the organization are asked to generate ideas. Or, experts and various consultants are brought in for a brain-storming session, or are commissioned to write papers identifying needs to be met and suggesting R/D&I programs to meet those needs. Or a formal needs assessment is carried out, consisting of polling user system personnel about their needs and how they might be met by R/D&I activities. All these examples represent what we are referring to as need identification by polling.

There is clearly some overlap between these examples and need identification by spontaneous insight: individuals included in the polling may ponder the questions posed to them and then generate the kind of a-ha! solution we have included in the spontaneous-insight category. The distinction between the two lies in the source of the stimulus and the degree to which organizational arrangements are needed to initiate and manage the process. Need identification by spontaneous insight begins with a self-starter, an individual who starts identifying needs without being specifically asked by anyone else to do so. And equally significant, the entire inception phase of need identification involves only that one individual. Need identification by polling, in contrast, requires an organizational stimulus (the request or polling) to set the process in motion. And since the process may involve large numbers of individuals who are so polled, management of the process tends to require the development of organizational arrangements that may in some cases become extensive and complex.

c. Comparison

Parents or members of a school board hear about an exciting new program in a neighboring school district. Or perhaps they read about some new approach, such as open education, which appears to be sweeping the country, and is the latest "in" innovation for presumably increasing the quality or the enjoyment of education. Their district has no such program. The need is defined by comparing what exists in the district with what exists somewhere else, or is being talked about or written about elsewhere.

An R/D&I organization has defined its organizational mission in a manner that places it in a competitive position with, let us say, five or six other R/D&I

organizations. All are competing for the same funds in the case of grants or contracts, or the same clients in the case of providing services or developing and marketing products. Comparison with the scope of activities pursued by one's competitors, or the types of R/D&I outputs they produce, suggests a set of needs.

Both these cases illustrate the process of need identification by comparison. The basis for the perception of need is only indirectly a real-world problem of the R/D&I or operating system. The immediate source of the perception is a comparison between what exists at a particular point in time in the programming of a particular R/D&I or operating system institution and what exists somewhere else. All aspects of the comparison make intuitive sense to the need identifier -- the comparative process as a means of identifying needs, the validity of the particular comparison made, and the need identified as a result of making the comparison.

Although we have no way of estimating how much of all need identification in education falls into this pattern, the frequent criticism of educational innovation as faddish suggests that there is a significant amoung of need identification by comparison, especially in operating systems.

C. Opportunistic Need Identification[3]

We use the term opportunistic to refer to those patterns of need identification in which the impetus comes primarily from the existence of a resource, and only secondarily from the existence of a problem. The availability of a resource, and its potential for use in a beneficial manner, is what in fact suggests the need. We distinguish two kinds of opportunistic need identification, differing in the nature of the resource to be exploited: (1) funding; or (2) a resource that could form the substantive basis of a product or program.

a. Availability of Funds

This pattern of need identification is particularly well illustrated by the impact of Title I funding on need identification in school districts, especially in large urban areas with significant numbers of low-income students. This population and its problems are not new to school systems. However, the appropriation of relatively large sums of federal money for educational programs targetted at this population a decade ago stimulated an unprecedented level of attention to their needs. The educational needs of low-income students suddenly emerged as a high priority programming concern of school districts and R/D&I organizations.

This basis of need perception is also becoming increasingly prominent among researchers, especially those who have been characterized as research entrepraneurs. As the federal government and other research sponsors channel funds to specific research areas, large numbers of researchers are attracted to these areas and pursue investigations that these sponsors are willing to support. The primary impetus for the shift in research areas in such cases is the availability of funds. Inherent interest in the subject area may be of some importance, but is secondary as a causal factor explaining the shift in the need identification focus and R/D&I activity of these researchers.

d. Availability of Potential Program or Product Resources

A new technology is developed for one purpose but appears to be adaptable to instructional settings as well -- e.g., computer technology, or the availability of low-cost electronic calculators. The adaptation process seems relatively simple and inexpensive; the potential benefits seem great. Adapting the new technology is identified as a need. The true impetus for this kind of need identification is the existence of the new technology as a potential program resource. The need identifier in this instance is likely to be an R/D&I organization able to make the adaptation, and perhaps also an imaginative teacher, administrator, or R/D&I sponsor who perceives the potential benefit of the new product.

A talented sculptor and perhaps a poet and a dancer reside in a given community and offer their services to the local school district as the basis for a high level program focused on the arts. The need for such a program is then enthusiastically identified by the district staff, the school board, parents and the community as a whole. But clearly, if the resource did not exist and become available to the district, it is unlikely that this particular need would have been identified.

Regardless of the source or basis of a perception of need, needs so identified have to be articulated into innovation requirements, and then filtered through some decisionmaking apparatus before R&D resources will be committed. We turn now to these subsequent steps in the need identification process.

3. To What Extent are Need Perceptions Translated into Innovation Requirements?

The process of translating perceived needs into innovation requirements in the field of education is influenced by three factors: (A) the nature of the knowledge base of the field; (B) the patterns of thinking that characterize need articulation in the field; and (C) the extent to which specialized organizational arrangements exist to carry out the translation process.

A. Nature of the Knowledge Base

The field of education has a social science knowledge base, and consequently somewhat limited intellectual consensus and a good deal of value-laden disagreement over goals and therefore needs. This puts a premium on vagueness in stating needs, and therefore complicates the problem of articulating needs in a manner that translates easily into innovation requirements. The vaguer the statement of a need, the easier it is to achieve agreement. The greater the specificity about the changes implied by a need statement (e.g., change procedure _a_ to procedure _b_), the less agreement is likely. The principal who agrees that there is a need for "increased communication between school and community," for instance, may change his mind when the need is defined in terms of a specific set of behaviors that he must change.

Equally significant in its impact on articulation of needs, the field of education has an inadequate and uncertain knowledge base and an ambiguous technology. It is difficult to define problems or to know what is needed to solve them. Consequently, people have a difficult time identifying and articulating needs, and for this reason also, tend to generate statements that are too vague to be genuinely useful. More often than not, formal needs assessment in education has been a dismal failure.[5] Typical of need statements in education are phrases that call for programs "to improve students' self-concepts," or "to develop creativity," or "to raise reading achievement levels." These statements suggest no particular program, or even type of program or programming parameters, to focus on in planning R&D activities. By way of contrast, we would assume that when IBM's need identifiers determined that a self-correcting feature was needed on their next generation of typewriters, this need was translated easily into a set of engineering requirements to guide subsequent research and development.

B. Patterns of Thinking That Characterize Need Articulation in the Field

We think of need articulation as basically a two-step process, beginning with definition of a problem and then continuing with conceptualization of the kind of product or program that might remedy the problem. Several patterns of need articulation can be distinguished, depending on the degree to which the attributes of the problem and potential product/program are analyzed and elaborated. The patterns can be depicted by means of a 2 x 2 table, with high vs. low (or absent) problem definition as one dimension, and high vs. low (or absent) program definition as the other.

		PROBLEM DEFINITION +	PROBLEM DEFINITION -
PROGRAM DEFINITION	+	1 + +	2 + -
	-	3 - +	4 - -

Cell 1 represents the most elaborate pattern of need articulation, the least common type in education. A problem is analyzed in sufficient detail to pinpoint specific elements in the problematic situation or condition in need of change, and perhaps even the amount of change in a given direction. The kind of program or product necessary to bring about those changes is then specified. This information is readily translated into innovation requirements for research, development, and evaluation (in the case of the R&D system) or for product acquisition (in the case of the user system).

We might find this pattern of need articulation, for instance, in an R/D&I organization with an extensive evaluation and research program tied to its development work. In such organizations, development is viewed as "successive approximations" to a final ideal product. Therefore, successive "generations" of an innovative program or product are developed. Evaluators continually analyze data on program performance under different implementation conditions. As problems are uncovered (e.g., gaps between expected and observed achievement levels), data analysis pinpoints specific elements in the problematic condition that appear to be pivotal in causing the problem, and suggests research and/or development activities to be carried out to remedy the problem in the next generation version of the product or program.

Cell 2 represents an all-too-typical pattern of need identification in education. Needs are defined almost entirely in terms of step two of the articulation process, program definition -- "we need a program that looks like this: . . . ." Step one, problem definition, is bypassed, or given minimal attention. Or perhaps problem definition is given considerable attention but is focused on organizational rather than educational problems.

Numerous organizational problems may suggest needed programs or products: a textbook publisher needs an exciting new product to recapture his declining share of the high school social studies textbook market; an audiovisual equipment manufacturer needs an overhead projector with features that will permit a wider range of applications in instructional settings; a school board needs to find an exciting new program to restore the district's innovative image and the board's own popularity in an election year. Though a financial, marketing, or political problem may be given considerable attention, little thought is given to educational problems as the basis of product/program need definition in these instances.

What distinguishes this pattern is that the focus of thinking in need articulation is on inputs to the educational process (what resources will be allocated or what programs or products will look like, etc.), rather than educational outputs (what impact resources or programs will have on students). Output orientation in need articulation requires extensive elaboration of the problematic educational situation or condition to be changed, and how the proposed remedy might bring about the needed change. Within the past decade, there has been a noticeable shift in emphasis in education from inputs to outputs. The transition is far from complete, and school systems are still defining many types of needs in input terms ("we need team teaching," or " ... ungraded classrooms," or ". . . open education"), with little more than the most superficial elaboration of how these innovations might improve the quality of education provided. But more and more, nudged along by federal and state requirements for funding, program needs are being articulated in terms of output criteria.

Cell 3 represents another common pattern of thinking in need articulation in education. A considerable amount of attention is focused on defining needs in terms of educational problems and needed changes in problematic situations. But need articulation essentially ends at that point. This pattern is illustrated by need statements calling for programs to "raise reading achievement levels" or to "increase communication between school administrators and community residents," supported by extensive data-based elaboration of the problem. But little or no attention is devoted to the kind of program perceived as needed to remedy the problem. Therefore, the brunt of the need articulation task is shifted to researchers and developers (or acquisition personnel), rather than the decisionmakers responsible for determining the needs to be met. Then, after considerable expenditure of resources to design of (or search for) a program to "raise reading achievement levels" or to "increase communication between school administrators and community residents," there is a good possibility that the same decisionmakers may reject the program, wondering who could have ever dreamed that this kind of program was needed.

When minimal attention is devoted to definition of even the problem, we find the situation represented by cell 4 -- limited or no thinking focused on problem or needed product/program. We find this pattern in educational settings where the most elaborate statement of need is represented by the phrase "a program to raise reading achievement levels". The cell 4 pattern is also characteristic of the vast number of school districts where needs are rarely identified (except in response to crisis situations) and innovations are rarely introduced.

C. Specialized Organizational Arrangements for the Translation Process

In those atypical settings where an extensive amount of need articulation occurs (as in cell 1), there appear to be specialized organizational arrangements to translate vague perceptions of need into innovation requirements. For instance, certain staff members are assigned responsibility for engaging in dialogues with sources of need perceptions to help them articulate what they have in mind. ("By communication, do you mean *x* or *y*?" "What would an ideal communication pattern look like?" "Is this what you mean? Or do you have something more like that in mind?") Or, need identification and R/D&I planning is a specialized, institutionalized, ongoing function.

We considered one example of this institutionalization earlier -- R/D&I organizations that use evaluation data on existing products as the basis of defining needs and planning research and development for future products. Other examples exist as well -- for instance, SEAs and LEAs that are developing and using management information systems, or R/D&I sponsors such as NIE that use the RFP mechanism to translate identified needs into innovation requirements to be met by prospective contractors. In both these instances, a substantial amount of specialized and even expert talent is assembled to carry out the translation and articulation process. In the case of the management information systems used by SEAs or LEAs (in the relatively rare cases where such systems are to be found), statisticians might conduct item analyses of test data to determine what kinds of questions are giving students difficulty, perhaps even what kinds of errors they are making. This information might be related to process data (if it were available) about classroom implementation conditions. And all this information might then be turned over to other specialists able to suggest what kinds of programs or program changes would seem to be needed to remedy the problems. Where an R/D&I sponsor uses the RFP mechanism, its staff is likely to work closely with experts in a field to detail so precisely the research questions to be answered, or the kind of program to be developed, that a major complaint made against the use of RFPs is that they turn researchers and developers into mere technicians carrying out specific tasks predefined by the sponsor.

However, these examples of institutionalization of need identification and articulation of need perceptions into innovation requirements represent the exception rather than the rule. More typically, needs are articulated poorly, and vague need statements are not translated into innovation requirements in time to affect the decisionmaking apparatus that commits R/D&I resources to meeting particular needs. We turn now to this final phase of the need identification process.

4. How are Need Identification Decisions Made?

Whatever the process by which a need comes to be perceived and articulated, some kind of decisionmaking apparatus must be activated before R/D&I resources will be committed to meeting the need. The complexity of the apparatus will depend on how many interests and/or levels in an organizational hierarchy are represented in the decisionmaking process, how much consideration is given to alternatives, and how sophisticated are the decisionmaking tools (and perhaps too how extensive is the empirical data base) used in the course of determining a course of action.

The simplest case would be represented by a single university researcher (or teacher or principal) who is the source of a need perception, who needs no funding or resources from others, and who would himself carry out the R/D&I activities required to meet the identified need. The idea is intuitively satisfying. Perhaps too, he tries to confirm the need by gathering impressionistic data or even analyzing some empirical data. Feasibility considerations might be given some minimal thought.

But less likely would be extensive analysis of alternative conceptions of needs to be met. If no major problems are uncovered by him in the course of this minimal screening process, the decision is made to commit a portion of his time to the project.

A somewhat greater degree of complexity is involved when the researcher is part of an R/D&I organization that pays for his time, especially if organizational resources (funding, staffing, etc.) are needed to carry out the project. Organizational decisionmaking generally requires successive screening of decisions at each point in the organizational hierarchy -- the researcher's own work team, then his unit or division, then the top echelons of the organization's management structure, their expert advisers, and the organization's board of directors. The amount of screening a proposal receives is likely to reflect the laws of supply and demand. Where demand for new ideas outweighs supply in a stable or expanding funding context, screening will be minimal. Where the supply of identified needs is greater than the demand or the existing resources, screening is far more elaborate, the originator of a new idea must do far more preparation and persuasion, and more ideas are rejected. In the early history of the regional laboratories, a stable source of institutional support for each laboratory seemed assured, and the problem for each laboratory seemed to be to generate ideas about needs to be met and programs to meet those needs. Ideas that seemed attractive were adopted easily, with a minimum of screening or choosing among alternatives or structuring or focusing need statements. The literature attests to the unhappy consequences of this situation.[4]

Decisionmaking mechanisms do not appear to have changed substantially. They remain relatively encapsulated -- within the confines of single organizations, and showing relatively little collaboration between KP and KU institutions or systems. Screening and decisionmaking in some sponsor organizations such as NIE may take an integrated view of KPU, but this is still atypical of most KP and KU institutions in the field. There are exceptions,[6] but it is still rare to find R&D and user organizations collaborating on the definition of needs and priorities to be met by R/D&I activities. Most decisions made by R&D organizations about the needs of user systems are made without any involvement of user system personnel. And as a rule there appears to be relatively little interaction between KP and KU personnel at any point in the need identification process. KP personnel generally identify user system needs on the basis of intuition or research (generally not observational data of classroom or school operations), but rarely as a result of talking with school personnel about their problems or spending time inside school buildings. KU personnel rarely devote their energies to educating R&D organizations about their needs, or requesting that a particular kind of program or product be developed by these external KP organizations to meet those needs.

Unlike sectors where market and technological forces are the most critical determinants of needs identified for R/D&I activities, need identification in educational R&D tends more often than not to ignore either user system demand or the technological readiness of the R/D&I system to adequately meet identified needs. Unlike more mature R/D&I systems where need identification tends to follow orderly, systematic, step-by-step procedures -- e.g., needs assessment, market research, capabilities assessment, and long-range planning -- need identification in education rarely shows evidence of disciplined analysis, rarely shows consideration of marketability (e.g., existing user demand patterns or preferences, or likely prospects for promotional campaigns to stimulate appropriate user demand or preferences) or feasibility (e.g., what is the state of the existing knowledge and technology base for meeting a specific need? what is the sequence of research and R&D activity needed to develop the program or product expected to best meet the identified need? what are the existing capabilities of the organization for carrying out these research and R&D activities? what activities will be required to produce the needed capabilities on an adequate level to insure program success? what resources will be needed to carry out these activities? how much will they cost? how long will they take?) Educational R/D&I proposals, budget justifications and documents of this kind often present a weak facade of considering these issues. But it appears to be relatively rare to find projects where these issues are taken seriously and are analyzed on the basis of extensive data-gathering and long-range planning techniques.

Part of the problem in education is traceable to the fact that the personnel who carry out need identification do not think in these terms. Need identification is a casual activity for them that intrudes occasionally on the work they do. They have not been trained to analyze problems in this way, or to use the sophisticated tools that exist in other sectors to carry out need identification. And they do not have the time to approach what is to them a rather minor concern in so time-consuming a manner. In short, part of the problem is the lack of institutionalization of the need identification function.

Another aspect of the problem is the lack of adequate data bases against which to judge the marketability and feasibility of various alternatives. There are demographic data bases that provide some useful clues about the size and distribution of potential markets for certain kinds of targetted materials -- e.g., materials targetted at black students, Hispanic-Americans, Native Americans, etc; bilingual materials (English-Spanish, English-French, English-Italian, English-Chinese, etc.); materials targetted at economically disadvantaged urban students; materials targetted at rural communities, etc. There are data bases that indicate where the most depressed achievement levels are to be found and therefore where the need is greatest support personnel in its use. The weaknesses of the need identification function in education, then, are felt throughout the KP-KU cycle.

There have been some recent initiatives to remedy this situation. We noted earlier in this chapter the appearance of increasing numbers of projects in SEAs and LEAs to design and implement management information systems and public accountability systems. We also noted suggestions of this approach in national and state assessment projects and in work on the development of social indicators applicable to education. In all these instances, it is expected that needs will be identified by comparing prespecified performance goals with current data on the degree to which a system is achieving these goals. NIE's KPU monitoring project is intended to provide a systematic data base about educational KPU institutions and activities. The assumption is that this data base will be used routinely to identify imbalances in KPU functioning and therefore needed new policies and programs.[7]

Other recent NIE initiatives have been designed to overcome the general lack of KP-KU integration in the need identification process and the fragmented, institution-by-institution character of the process in this sector. NIE's State Dissemination Capacity-Building Program and the Local Problem-Solving Program, for instance, are intended to strengthen state and local capabilities for need identification and link user system personnel to KP resources that can be used to solve locally defined problems.[8] The Institute's R&D Utilization program is designed to provide assistance to school districts in locating and using externally developed R&D outputs to meet their locally defined needs.[9] Similarly, NIE's use of invitational conferences to define research agendas and needed R/D&I activities was intended to bring the research communities from education and the disciplines into the need identification process with maximal efficiency -- getting simultaneous input and feedback from the leaders of a given research area (and at the same time developing some consensus on priorities and disseminating support personnel in its use. The weaknesses of the need identification function in education, then, are felt throughout the KP-KU cycle.

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It will be some time before the effects of the various NIE and other federal initiatives can be assessed adequately. However, at the present time it appears that need identification in education remains for the most part fragmented and severely limited in KP-KU integration.

5. Summary

We have considered in some detail a number of aspects of need identification in education -- who generally identifies needs, what the sources of need perception are, how (if at all) need perceptions get translated into innovation requirements during the need identification process, and how decisions are made to commit R/D&I resources to meeting specific needs. Although there is clearly some variability in need identification patterns, some general comments would seem to be in order about the typical or modal process and especially its inadequacies.

First and foremost, the process tends to be episodic, sporadic, somewhat random and unplanned. Whatever periodicity and order does exist in the process seems to have been imposed by the annual funding cycle of federal, and to a lesser degree, state agencies. It is relatively unusual to find the need identification function institutionalized, carried out by specialized personnel on an ongoing routinized basis, as part of a comprehensive long-range planning and monitoring operation that significantly influences top management decisionmaking.

Second, need identification in education is generally intuitive and opportunistic. Data-based need identification is probably the least common form. This is not necessarily a weakness. Given the quality of most educational data, intuition may be a far more reliable basis for need identification, especially when the source of the intuition is an individual or group possessed of great knowledge and keen insight. But what must be underscored are the limited possibilities in education for checking intuitive or opportunistic need perceptions against empirical data that shed some light on the marketability or feasibility of alternative proposals for needs to be met.

Third, there is little collaboration between KP and KU systems in the definition or articulation of needs, or in the making of critical decisions about committing R/D&I resources to specific projects to meet specific needs. Consequently, there is minimal KP-KU integration, and we witness the unfortunate spectacle of educational R/D&I organizations generating products for which there is a limited (if any) market while user system personnel find it necessary to divert considerable resources of their own to developing materials to meet needs they perceive being met inadequately (or ignored altogether) by R/D&I organizations.

Comparison with what we might propose as a more effective model of need identification should underscore the key weaknesses in need identification in education and suggest possible points of leverage for policy intervention.

II. MODEL OF EFFECTIVE NEED IDENTIFICATION

Based on our observations of need identification in more mature R/D&I systems where there is effective KP-KU integration, we conceive of at least six requirements for a maximally effective R/D&I need identification function.

First, need identification would have to be institutionalized -- carried out in an ongoing routinized manner by specialized personnel, in specialized organizational units, using resources specifically allocated for such activities as needs assessment, market research (or in the case of a KU organization, availability of products or programs to meet given needs), capabilities assessment, and long-range planning.

Second, whatever need identification mechanisms were created would have to bring together systematically and integrate effectively the different sources and bases of need identification that are operative in a given sector -- e.g., sources of need identification located in the R&D and operating systems and in the external environment; intuitive, opportunistic, and data-based sources of need perception.

Third, personnel responsible for the conduct of the need identification function would have to be linked to carefully constructed and well developed data bases. And they would have to be trained in the use of analytical procedures designed to: (1) pinpoint problems in system functioning and innovation requirements to overcome these problems; and (2) assess alternative options for meeting each of the identified needs. For need identification at the level of macrostructure management, it would seem especially important for the data bases and analytical procedures to be targetted at detecting imbalances in system functioning.[11] For need identification in all parts of the system (macrostructure management and management of individual R&D and operating system institutions or networks of institutions), it would seem essential for the system to be geared toward identifying shortfalls between performance goals and current levels of achievement. It would be particularly helpful if the system could also provide information that related these problem areas to process data that might help to explain why the system is performing at less than the expected levels of achievement and what specific innovation requirements are called for to overcome these difficulties.

If need identification personnel are to provide the kind of information needed to contribute to the need identification process in KP institutions, their data bases and analytical procedures would have to be able to provide estimates of the marketability and feasibility of alternative proposals for innovations to meet identified needs -- e.g., information about existing user demand levels (or estimates of how much potential user demand could be stimulated) for alternative products or programs that might be developed, information about existing capabilities (knowledge and technology bases, skilled personnel, organizational readiness) for producing these alternative outputs and estimates of what would be required to produce the needed capabilities. Similarly, if need identification personnel are to provide comparable support for the decision process in KU institutions, their data bases and analytical procedures would have to be able to provide information about the range of existing products and programs that could be adopted or adapted to meet an identified need, the relative advantages and costs of each, the existing capabilities in the user system for effective implementation of these various innovations, and estimates of what would be required to produce the capabilities needed for effective implementation, how long it would take, and how much it would cost.

Fourth, effective conduct of the need identification function would seem to require specialized attention to articulation of perceived needs into specific innovation requirements -- ideally, requirements for alternative conceptions of the innovation(s) to be developed, adopted, or adapted to meet a given need. These alternative proposals would then be turned over to experts from the functional areas to use their expertise and the system's data base to draw up long range plans detailing the R/D&I sequence (or in a user institution the adaptation-implementation-revision sequence) required, existing and needed capabilities, time frames, and costs.

Fifth, the decision apparatus used to make need identification decisions in an effective system would have to integrate effectively KP and KU perspectives (i.e., both technological capabilities and existing or potential user demand), draw on all available data bases and sources of insights and systematically apply rigorous decision criteria for screening and selecting alternative proposals for outputs to be developed through KP activities or adopted/adapted by user organizations.

Finally, in an effective system we would expect need identification to be carried out as part of a broader long-range planning and monitoring function. The integration of need identification with long-range planning and monitoring is fundamental to our conception of maximally effective need identification activities.

III. ISSUES

Comparison of existing patterns of need identification in education with this perhaps idealized model suggests a number of issues that need to be considered in developing strategies for improving the need identification function in education.

1. Institutionalization of a need identification/long-range planning function:

What kinds of policy interventions are needed to institutionalize the need identification/long-range planning function on the level of macrostructure management and on the microstructure level of individual sponsor, performer, and user organizations or networks of organizations?

What kinds of resources are needed?

Can specialized personnel with the requisite skills be attracted from other sectors? What incentives are needed to attract them? How large is the personnel pool that might be attracted? How large a personnel pool would be needed, for what kinds of staged institutionalization, progressing at what rate?

How can we best train new personnel for roles in the need identification/long-range planning function in different organizational settings (e.g.: superordinate system agencies vs. performers vs. users vs. various kinds of networks of organizations)?

How readily can need identification technology (e.g.: needs assessment, demand analysis, product availability analysis, capabilitites assessment, long-range planning) be transferred from other sectors? What kinds of adaptations are needed?

2. Coordination and integration of existing sources and bases of need perception:

How can we best design a system that brings together effectively all available sources and bases of need perception in a sector? What procedures can be desinged to routinely gather data and judgements from key sources inside the R/D & I system and in its external environment for systematic, periodic analysis of emerging needs and opportunities for R/D & I activity?

3. Design and use of information systems:

What are the essential design requirements for information systems that can be used routinely on a periodic basis to pinpoint: (a) shortfalls between goals and performance, and (b) imbalances in system functioning?

What kinds of data and analytical procedures are needed to relate impact shortfalls to innovation requirements?

What kinds of data and analytical procedures are needed to assess achievement of different kinds of impact goals in the sector?

What kinds of input, context, and process data and analytical procedures are needed to relate impact shorfalls to innovation requirements?

What kinds of data, analytical procedures, and decision criteria are needed to identify imbalances in KPU system functioning and requirements for needed policy initiatives?

What are the essential design requirements for an information system to assist KP organizations and R/D & I sponsors in: (a) identifying the kinds of new KP activities needed most, and (b) assessing the potential marketability of a specific proposal for a new KP activity? What kinds of data and analytical procedures can provide the most useful estimates of marketability for given innovation types or specific innovation types or specific innovation proposals; availability of existing products to meed those demands; likely prospects for implementation/utilization success and long-term prospects for maintnnenance in user systems with varying levels of required capabilities; etc.)

What are the essential design requirements for an information system to assist KU organizations (and organizations that provide funding and technical assistance for KU organizations) in: (a) identifying the kinds of KP outputs required to meed their needs, and (b) determining whether acquisition personnel will be able to locate satisfactory existing R?D & I outputs that will meet those needs, or whether instead they will have to either negotiate with external R & D organizations or draw on internal KP resources to produce the needed outputs? What kinds of data and analytical procedures can provide the most useful information on these questions?

What are the essential design requirements for information systems to assist macrostructure management, KP organizations, KU organizations, and KPU sponsors in determining the feasibility of alternative proposals for needed innovations to be developed or adopted/adapted? What kinds of data and analytical procedures will provide the most useful estimates of: existing KP and/or KU organizational capabilities? Available personnel pools and subcontractors in other sectors who can be drawn on for different kinds of efforts and support activities? Sequences of activities needed to build required capabilitles? Sequences of research and R/D & I activities needed to develop, disseminate, and/or adequately implement and utilize a specific R/D & I output, given existing KP and/or KU capabilities? Costs? Time frames?

What kinds of data, formatting, aggregation, retrieval procedures, information networking arrangements and coordination policies would encourage maximal use of macro-level data bases by micro level the macro and micro levels?

What factors must be present in the relationship between a need identification unit and top management to insure integration of need identifcation with long-range planning, system monitoring, and development of policies and strategies?

What are the essential design requriements for an information system that integrates need identification data bases with data bases on system operations, outputs, and impact so that a comprehensive management information system is available to inform top management decision-making?

What factors must be present in the relationships between a need identification unit and other units that carry out R/D & I activities to provide smooth integration of need identification with all other R/D & I functions and efficient/effective flow of information?

IV. CONTEXTUAL FACTORS

In developing policy options and management strategies for improving need identification processes in education, consideration must be given not only to these generic types of issues, but also to distinctive contextual factors in the education sector that affect the desirability and feasibility of certain approaches. Five sets of contextual factors seem especially important: (1) the large backlig of already identified needs that are not being adequately met; (2) the inadequate state of development of the system's R/D & I capabilities; (3) the political context of need identification in education (both internal and external to the R/D & I system); (4) the vagueness and diffuseness of goals in the education sector; and (5) the weaknesses of the field's knowledge and technology base.

1. Problems Posed By Surplus of Need and Immaturity of System Capabilities

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1. Problems Posed By Surplus of Need and Immaturity of System Capabilities

Two of these contextual factors are closely interrelated. (1) There is a large backlog of already-identified need that are not being adequately met by the educational R/D & I system because (in part) (2) the capabilities of that system are inadequate to meeting thsoe needs. In mature R/D & I systems, need identification is followed by a sequence of R/D & I activities that lead to production and/or utilization of outputs that effectively meet the identified needs. And probably more often than not, need identification activities are carried out in these mature systems primarily to identify hitherto unthough-of needs -- e.g., innovations that will give a KP to KU organization a competitive edge.

In education however, the desire for a competitive edge is less prevalent, and identification of new, hitherto unthought-of needs a less salient concern because there is a large backlog of already-identified needes that have not been adequately met. Without specialization or institutionalization of the need identification processes, need identifiers are already generating more needs than the system is capable of meeting. Therefore, diverting scarce resources to need identification as a new area of specialization makes sense only if it functions as part of a larger planning and decisionmaking system for which there is acritical need. The logical interrelationship between need identification and long-range planning becomse clear once attention is focused on the kind of information required to make need decisions in a sector with immature capabilities.

The key need identification problem in education is to develop approaches that permit identified needs to be assessed against criteria of marketability and especially <u>feasibility</u>. It seems reasonable to argue that significan amounts of available R/D & I resources are being wasted because they are invested in projects that had limited chances of success from the very outset -- e.g., projects that ignored large gaps in the knowledge and technology base needed to produce the output, projects that overlooked the inadequate state of development of R/D & I resources and capabilities required by the project, etc. Before resources are committed to identified needs, it would seem advisable to test alternative proposals against feasibility criteria. But before this can be done adequately, the field needs a data system and analytical procedures that can provide a reasonable basis for reasibility estimates.

Given the immaturity of system capabilities, any effort to develop this kind of feasibility-oriented data system (and the requisiste analytical procedures) must take a long-range capacity-building view. It must build in consideration of both existing capabilities and needed future capabilities, as well as how these future capabilities are to be developed. Once the needed capabilities information has been assembled, the logic of the information system suggests using the information not only to estimate the relative feasibility of alternative proposals but also to plan for staged development of needed future capabilities, to insure the success of whatever project is selected. And once the use of the information system has been carried this far, the logic of the system suggests carrying it one step further, to monitoring the development of these capabilities andy system functioning to sucessfully produce the planned-for output. Clearly, then, in a sector such as education, characterized by a surplus of identified needs, and inadequately developed capabilities to meet those needs, allocation of specialized resources to the need identification fucntion seems reasonable only when need identification is viewed as part of a more comprehensive long-range planning and monitoring function.

2. Problems Posed by the Political Context of Need Identification in Education

This point is reinforced by consideration of the political context of need identification in education -- both the external and the internal political context. The approach to the need identification function that pervades our analysis suggests an effort to "rationalize" decisionmaking, in a sphere that we have emphasized repeatedly is highly vulnerable to political considerations. We have noted how many of the needs that the educational system responds to are defined by organizations and people in the system's external environment, and how many of the demands made on the schools are derived primarily from social and political movements in that environment.[12]

We also note in other chapters how little demand there is within the education sector for information about needed innovations, and how much information about needs and about gaps between objectives and performance is either ignored or used only to justify decisions made on other grounds.[13] Schools have what has been described as a "domesticated environment."[14] School personnel have not had to concern themselves with competion or market forces: their funds and their "clients" (i.e., students) have been assured. There have been few incentives to develop a "competitive edge" -- i.e., to put a particular school out front with the newest and best innovation, as a leader in its field. Consequently, there has been relatively limited interest in information that could be used to develop innovations that might improve system performance. Lacking has been the spirit of entrepreneurship that we emphasized so strongly in our analysis of historical development as a comparative feature of R/D & I systems.[15]

Given this situation, what is needed in the education sector is not a system that simply identifies needs so much as a system that provides decisionmakers with information about the likely consequences of different need identification decisions. An information system designed to "make decisions" --i.e., to tell decisionmakers what decisions to make -- is likely to be ignored unless its "advice" is congruent with what the decisionmakers had in mind anyway. However, an information system that can provide reasonably reliable estimates of likely consequences of particular decisions is likely to be used to shape policies and programs in a way that maximizes probable benefits and minimizes probable difficulties.[16] Development of this latter kind of information system would seem to require integration of need identification decisionmaking with data bases on marketability, feasibility, long-term capability planning, and system monitoring.

3. Problems Posed by the Diffuseness of Educational Goals

The surplus of identified needs in the education sector, the immature state of the system's R/D & I capabilities, and the external and internal political context of the system all suggest the desirability of integrating need identification processes in education with a comprehensive long range planning and system monitoring function. However, the feasibility of creating the kind of system we have described seems severely limited by the vagueness and diffuseness of goals in the education sector. We noted earlier in our analysis of goal-setting in the education sector how rarely goals have been defined with sufficient specificity to permit operationalization into performance expectations and achievement benchmarks.[17] In the absence of clear goals and performance specifications, it is difficult to identify needs in terms of shortfalls between system goals and system functioning; it is difficult, too, to know precisely what kinds of data to collect and what kinds of questions to ask in analyzing the data. And in the absence of precise, stable goals, long-range planning and system monitoring seem pointless. Clearly, then, no detailed design work can be done on developing an integrated need identification/long-range planning and monitoring system until a framework of system goals and performance specifications has been elaborated.

4. Problems Posed by the Weakness of the Field's Knowledge and Technology Base[18]

In most fields, we tend to think of need identification as occurring prior to, or at the beginning of the development process, e.g. when the user and developer work together to define what sort of product or program is needed. Typically, need identification is then assumed to have been completed.

This, however, is a very limited concept of need identification, and one that works well only under conditions of overall system maturity and certainty -- i.e., when: (a) users can clearly specify what they need; (b) the developer (and producer) know exactly what the user means when he describes his need; (c) the developer is then capable of producing the product and then saying with assuredness to the user, "Here is what you asked for;" and (d) it is then obvious to users what to do with the product and how to use it effectively. As an example, an airplane manufacturer may well be able to specify so clearly the requirements for a needed airplane part that the part can be developed to specifications and then, in effect, simply "plugged in."

However, these conditions are not present in the field of education. Here, the knowledge/technology base of the field is so weak that the user cannot clearly tell the developer what is needed, the developer would not be sure how to go about developing the product even if the user could specify what was needed, and the user generally lacks the knowledge base and technical skills required to use the product effectively once it is developed.

Therefore, under these conditions of high uncertainty and overall system immaturity, need identification must be seen as a broad, ongoing, continuous process, a process that: (a) enables the developer throughout the various stages of development to seek and receive additional information and clarification from the user; and (b) not only involves successive stages of the development process, but is continuous through dissemination, implementation and utilization, until the need has been refined sufficiently for a usable product to be available. Under these conditions, then, need identification and development are a continuous recycling process of adjustment and modification, a tailoring of the product which does not end with the development stage per se but continues through installation and use in the operating system.

The implication of this would seem to be that need identification should be conceived in terms of two somewhat different processes in education, and may require two somewhat different institutionalized specialties. In this chapter, we have been focusing on need identification as it is generally understood, i.e. as a process that occurs early in the innovation process and prior to development work to meet some of the longer term needs of the operating system. However, in education, what seems to be called for is another, additional kind of need identification, conceived as a continuous "tailoring" process throughout the innovation process -- identifying and feeding back product requirements, specifications and modifications to increase the attractiveness, usability and effectiveness of development outputs within the user system.

We have been suggesting throughout this chapter the requirement for a need identification specialization within the planning/management function. What we are pointing to briefly here is an additional requirement for a need identification specialization within development teams, responsible for "specifying" and "tailoring" so that development outputs can be readily absorbed and used in operating systems.

(c) Lacking too are the kinds of data and information systems we have described here as essential to effective functioning of need identification in education.

(d) Operating systems are generally functioning under such severe financial constraints that there seems to be little likelihood that school systems will (at least in the near future) consider allocating sizeable budget lines to need identification personnel or supports for the need identification function.

(e) Systematic need identification is not generally a high priority concern of operating systems, just as long range planning of curriculum and instructional programs tends to be lacking. School system administrators generally devote all or virtually all of their attention to more pressing immediate problems, which seems to bring to the forefront more needs than the system can meet without their institutionalizing a new speciality to identify more such needs. Lacking is an orientation toward long range planning or thinking of systematic need identification as an essential component of system management and policymaking.

2. Needed Research

What this suggests is that we need to learn more about what is feasible within the current realities of the operating system -- what is there now that can be built on, what perceptions and attitudes are likely to facilitate or hinder the institutionalization of a need identification function, what kinds of existing personnel or organizational units might be called on to assume these responsibilities as part of the jobs they are already doing, etc.

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arrangements or information bases if they were made available to them, what would make specific possibilities for need identification arrangement or supports more attractive to them, etc. A "quick and dirty" analysis of this kind might be made even more useful if those who provided information could be given the time to study and react to the draft report and then attend a conference of participants. At such a conference, they might be asked to share their reactions and then collaborate on outlining the design requirements for need identification mechanisms and arrangements they might be willing to install and try in their school system.

The above approaches might produce a somewhat representative picture of the existing base for a need identification function in school systems across the country. In addition, a second line of inquiry that might be highly useful would involve identifying and describing exemplary need identification/long-range planning mechanisms in education. This might be undertaken after completion of the (systematic or quick and dirty) survey phase, or after a sufficient amount of survey data had been gathered to identify a range of exemplary arrangements. Or, it might be conducted simultaneously with the survey phase, using knowledgeable informants and snowballing approaches to identify exemplary cases. Such research could provide (a) in-depth documentation of individual exemplary cases; and (b) cross-case analyses of patterns, data bases, information systems, resources, capabilities, organizational arrangements and factors that facilitate gathering and use of the requisite information as the basis of need identification and long-range planning and decisionmaking.[22]

3. Policy Choices

Once this kind of empirical research had begun to accumulate, a basis might exist for further decisionmaking on whether or not to proceed, and if so, what the proper federal role might be in the institutionalization of a need identification function for operating system decisionmaking.

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perform other important roles. For instance, need identification, monitoring and long-range planning (of one or another degree of rigor) might be a function of district administrators whose primary responsibilities are in the area of instructional planning or curriculum development. Or it might be carried out by district administrators who spend most of their time placing information into and analyzing the information that somes out of the district's management information system. Or, it might be assigned to a district's (or a state region's) curriculum specialists who tend to work more directly with teachers, supporting implementation and utilization processes. Or the function might be carried out on a contractual basis with specialist agencies who have an ongoing relationship with specific districts in a manner resembling contracts between school districts and technical assistance organizations. Or, somewhat elaborate networks might be established involving any one or more of the above options linked to a specific person or staff committee in each school. This combining of the need identification function with others (especially those linked intimately to district decisionmaking or school-level implementation) might even have the added advantage of increasing the likelihood that the needs so identified will in fact have some impact on district decisionmaking and planning and classroom practices.

The possibilities are endless. The point is, the nature of what is to be designed and the mechanisms established to make what is designed available to local districts and schools is likely to be significantly affected by prior decisions made about which of these various options are most likely to be accepted and used by the districts. Hypothetically, we can envision design work producing outputs that could be plugged into any of these options. However, once we move from thinking in terms of only materials and training programs to also thinking in terms of information flows and delivery systems, it probably becomes more important to have more precise information about the form the function is likely to take in the school and school district.

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that whatever centralized resources were developed, they would have to be readily available and easily accessible to local units, at little or no cost, and would have to be designed so that they could be used easily with little or no outside assistance once the capabilities had been developed at the local level.

Presumably, the design work would be carried out to a level of specificity sufficient to permit school systems to select and experiment with the implementation of any one of the models. It would seem essential to include SEA and LEA personnel through such a design effort, whether in a staff or an advisory capacity (or both).

5. Trial Implementation and Implementation Research

Clearly, given our limited knowledge at this time about need identification in education and about implementation requirements for the institutionalization of need identification, a considerable amount of trial and adaptation is likely to be required, accompanied by extensive documentation and analysis of the process. Such research can reasonably be expected to provide information not only about the relative merits of different models for implementation in different types of organization settings but also about adaptations or modifications needed in the models, about required implementation conditions and implementation supports to make implementation of the models effective, and, more generally, about the practice setting as an innovation system.

6. Development of Implementation Supports

Finally, it would seem essential to develop implementation supports to assist school districts who choose to use any of these need identification models. We would include here the development of both packaged materials and interpersonal technical assistance services to support the implementation of these models, in different kinds of organizational settings, starting from different points of organization readiness. Packaged materials, for instance, might include elaborately documented descriptions of the alternative models with detailed how-to-do-it guides; checklists for assessing existing patterns, data bases, resources, capabilities, information needs, etc.; analyses of needed skills and capabilities per task, with resource guides providing alternative sources or approaches for developing each; self-evaluation instruments for assessing progress made toward more effective levels of functioning, etc.

Presumably, this work would reflect the findings of the implementation research mentioned earlier. Also, we would assume such a development effort would benefit substantially from the involvement of personnel from SEAs and/or LEAs which participated in the trial implementation and other SEAs and/or LEAs considering future implementation.

We recognize that institutionalization of an optimal need identification/long-range planning function on the micro-level is generally unlikely for some time to come. However, it does appear that macro level resources to facilitate the institutionalization of a need identification function on the micro level could be developed at this time. For instances, work might be begun on the development of the needed data bases, information systems, analytical capabilities, etc. in centralized settings, designed in such a way that micro level institutions could draw on these resources without developing highly specialized need identification/long-range planning mechanism of their own. Required implementation supports for these models might focus on how individual LEAs, SEAs or R/D&I institutions might link up to the centralized data bases and information system, how they might frame their questions so that they could be answered in some form or other through the use of the centralized system, and especially how technical assistance groups could help these micro level institutions to best use the macro level need identification/long-range planning resources and capabilities.

VI. CONCLUSIONS

Need identification in education is currently a random and chaotic activity, carried out haphazardly if at all. The bases of this activity tend to be intuitive or opportunistic; data based need identification is not the norm. The stimulus for need identification tends generally to be external pressures -- e.g., court decisions or demands of special interest groups. The pattern of identifying needs through systematic, ongoing analysis of routinely collected data bases seems to be relatively rare. Even more rare, it seems, are mechanisms that link need identification to system monitoring and long-range planning activities, or that relate identified needs to data bases that could permit development of realistic estimates of marketability and feasibility.

As long as this pattern holds, educational R/D&I is likely to remain an inefficient (and probably, too, an ineffective) enterprise. However, until educational R/D&I priorities are conceived in long-range terms, and until system decisionmaking reflects an understanding of educational R/D&I in terms of the system's requirements (e.g., for capability building and for ongoing monitoring and long range planning), this pattern is likely to continue, retarding further system maturation.

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FOOTNOTES

1. For a good statement critizing the failure to include practitioners in need identification for educational R&D, see Herbert J. Brownell's article in the Journal of Research and Development in Education, Vol. 1, No. 4, Summer 1968, USOE-Funded Research and Development Centers: An Assessment. For good summaries of the argument for institutionalizing a practitioner role in need identificaton for the R/D&I System, sec: National Institute of Education, Request for Proposals to Establish an "R&D Disseminaton and Feedforward System" (Washington: NIE, 1976); also, Information Dissemination and Exchange for Educational Innovatous: Conceptual and Implementation Issues of a Regionally-Based Natonwide System, Michael Radnor, Durward Hofler, and Robert Rich, eds. (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University 1977), especially the following two chapters: Susan Klein, Richard McCann, and Mary Saily, "The R&D Exchange: An Emerging Effort;" and Michael Radnor, Robert Rich, and Durward Hofler, "The RDx System: Concepts, Strategies, Practices -- An Overview."

2. For instance on state assessment projects, sec: Educational Testing Service, in collaboration with the Education Commission of the States, State Educational Assessment Programs (Princeton: ETS, 1973; Educational Testing Service, in collaboraton with Conference of Directors of State Testing Programs, State Testing Programs (Princeton: ETS, 1973); Martin Hershkowitz, Ed., Statewide Educational Needs Assessment: Results from Selected Model States (Silverspring, Md.: Consortium of State Education Agencies, 1974); and Also on State assessment projects, see the following papers presenting at the Annual Meetings of the American Educational Research Association. At the February 1973 meeting in New Orleans: John N. Pyecha, The Approach to the Design of the North Carolina Statewide Assessment of Educational Progress; William J. Brown, Jr., The Promotion, Dissemination, and Utilizaton Plan for the North Carolina Statewide Assessment of Educational Progress; Donald Woodington, The Challenge of Accountability for Effective SEA Administration; Arthur R. Olson, Cooperative Accountability Project; Archie A. Buchmiller, The Legislative Mandates Contained in Various State Educational Accountability Statutes; and Michael J. Grady, Jr., An Evaluation of Accountability Programs in Colorado. At the April 1974 meeting in Chicago, sec: Alexander I. Law, Major Changes in the California Assessment Program; Albert J. Magoon, Victor R. Martuza,

Alberto P.S. Montare and Bruce W. Tuckman, Phi Delta Kappa Needs Assessment: Educational Goal Attainment Tests; and Bruce W. Tuckman and Alberto P.S. Montare, Phi Delta Kappa Needs Assessment: The Application of Educational Goal Attainment Tests. On the Natonal Assessment, see for instance, the following papers presented at the February 1973 meeting in New Orleans: Larry E. Conaway, Some Implications of the Natonal Assessment Model and Data for Local Education; and Lewis A. Bonney, Application of the National Assessment of Educational Progress Philosophy in San Barnardino City Schools. Sec, too, the following papers presented at the Annual Meeting of the American Educational Research Association in Chicago, April 1974: W.T. Rogers and David J. Wright, The In-School Sample Design for the Natonal Assessment of Educational Progress; and Bob L. Taylor, Potential Uses of National Assessment Model at the State and Local Levels.

On school or school district management informaton systems see, for instance: Carmelo V. Sapone, CURMIS. Curriculum Management Information System (and) Prospectus of a Design to Assist a High School Staff in the Evaluation of its Program; Paper presented at the Annual Meeting of the National Council for the Social Studies, November 1972, ERIC ED 075 281; Council of the Great Cities School, PMIS: System Description PMIS Project. Planning and Management Information System. A Project to Develop a Data Processing System for Support of the Planning and Management Needs of Local School Districts, April 1972, ERIC ED 063 647; and for the June 1973 PMIS Final Report with the same title as the April 1972 report, sec ERIC 079 864. Also sec: K.M. Hussain, Development of Information Systems for Education (Englewood Cliffs: Prentice-Hall, 1973). A substantial number of papers on management information systems in education have been presented at the annual meetings of the American Educational Research Association, including the following: At the February 1973 meeting in New Orleans, Juris C. Lasmanis, Design and Use of An Information System to Support School Planning-Evaluation. At the April 1974 meeting in Chicago: Bernard M. Barbadora, A Description of the Cincinnati Public Schools' School Information System; and Stanley A. Rumbaugh and Dorothy R. VanLooy, A Procedure for A Management Information System. At the April 1975 meeting in Washington, D.C.: Barry A. Clemson, The MIS Problem Reconceptualized; and John L. Hyman and J. Jackson Barnette, The Design of a Future Oriented Sensing System for the Identificaton, Production, and Disseminaton of Natonal Education Information Needs. At the April 1976 meeting in San Francisco, Ying C. Chuang, Management Information System Development for a State Department of Education.

In addition, management information systems in use in various school districts have been discussed in various AERA symposia. For instance, at the April 1974 meeting in Chicago, staff members of the Philadelphia Public Schools participated in a symposium entitled, "The Past, Present and (Hopefully) Future of a Multi-Level Infomration Feedback System for a Large City's Schools." At the April 1975 meeting in Washington, models for systems and systems in use in school systems were discussed by academics and practitioners in a Discussion Session entitled, "Management Information Systems in Education; also at this meeting personnel from state departments of education in Alabama, Florida, North Carolina, and South Carolina discussed the design and use of state education management information systems in a symposium entitled "Data Derived Through Automated Management Information Systems as a Basis for Decisionmaking."

On Social indicators, see: Raymond A. Bauer, ed., Social Indicators (Cambridge: The M.I.T. Press, 1966); Eleanor B. Sheldon and Wilbert E. Moore, eds., Indicators of Social Change: Concepts and Measurement (New York: Russell Sage Foumdation, 1968); Otis Dudley Duncan, Toward Social Reporting: Next Steps (New York: Russell Sage Foundation, 1969); Daniel Bell, "The Idea of a Social Report,: The Public Interest, No. 15, Spring 1969; Mancur Olson, Jr., "The Plan and Purpose of Social Report," The Public Interest, No. 15, Spring 1969; Peter J. Henriot, Political Implications of Social Indicators, paper presented at the Annual Meeting of the American Political Science Association, Chicago, Sept. 1971; and Leslie D. Wilcox, Ralph M. Brooks, George M. Beal, and Gerald E. Klonglan, Social Indicators and Societal Monitoring: An International Annotated Bibliography (San Francisco: Jossey-Bass/Elsener, 1972).

3. This chapter was drafted before we saw the Rand Corporation's reports of its Change Agent Study. However, when we did get to review this study, we were delighted to note their finding that opportunism was a frequent basis project initiation. See: Peter W. Greenwood, Dale Mann, and Milbrey Wallin McLaughlin, Federal Programs Supporting Educational Change, Vol. III: The Process of Change (Santa Monica: Rand Corporation, 1975); and Paul Berman and Milbrey Wallin McLaughlin, Federal Programs Supporting Educational Change, Vol. IV: The Findings in Review (Santa Monica: Rand Corporation, 1975).

4. On the failure of formal needs assessments conducted in the planning phase of various regional laboratories, see Kjell Eide, "Program Planning in the Regional Educational Laboratories," included in appendix to Francis S. Chase, The National Program of Educational Laboratories (Washington: Office of Education, 1968).

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5. Ibid.

6. The Northwest Regional Laboratory appears to be one clear exception, at least as its program and modes of functioning have been described in the literature. For instance, see: Larry McClure, Grassroots R&D: Meshing Regional and National Resources to Solve Educational Problems. A Case Study and Comparative Analysis of Regional Educational Laboratory Approaches to Research and Development (Portland: Northwest Regional Educational Laboratory, 1977). Also see: Northwest Laboratory's Institutional Capability Statement attached to RFP responses such as their response to NIE RFP to Establish an "R&D Dissemination and Feedforward System," Regional Exchange Component.

7. On the proposed ICPU Monitoring System, see: Natonal Institute of Education; Dissemination and Resources Group, R&D System Support Divison, Program for Monitoring the Education KPU System: Current and Planned Activities, (Washington: NIE, October 1, 1976); also see earlier program statement, R&D System Support Program (Washington: NIE, April 12, 1974).

8. See, for instance: National Institute of Education, Request for Proposals for Evaluation of the State Capacity Building Program in Dissemination (Washington: NIE, 1976); National Institute of Education, Dissemination and Resources Group, Dissemination and Resources Group Program Plan, FY 1978 (Washington: NIE, August 1976); Natonal Institute of Education, Fiscal Year 1977: Program Plans. Executive Summary (Washington: NIE, January 1976); National Institute of Education, Preliminary Program Plans: FY 78. Executive Summary (Washington: NIE, July 1976); and National Institute of Education, The Status of Education Research and Development in the United States: 1976 Databook (Washington: NIE, 1976).

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10. For instance, see: Patricia E. stivers, "Researchers at NIE: From Planning into Action," Educational Researcher Vol. 3, No. 5, May 1974.

11. This is the language used in the NIE R&D System Support Division's description of its Education KPU Monitoring Program, April 12, 1974.

Carl H. Rittenhouse, Innovation Problems and Information Needs of Educational Practitioners (Menlo Park: Stanford Research Institute, 1970); Colin Mick, Richard Farr, Kenneth Bowman, Suzanne P. Hawkins, Robert Wade, Douglas Hall, Matilda B. Paisley, William Paisley, Developing a Sensing Network for Information Needs in Education (Stanford: Institute for Communication Research, Stanford University, 1972), ERIC ED 066 622.

21. For instance, see: National Institute of Education, Dissemination and Resources Group, Dissemination and Resources Group Program Plan, FY 1978, op. cit.

22. Such in-depth documentation with cross-case analyses might follow the pattern used by The Oregon Studies in Research Development, Diffusion, and Evaluation (Monmonth, Oregon: Teaching Research Division, Oregon State System of Higher Education, 1972), H. Del Schalock, Director; see especially, Vol. 4, Part 1-3, Case Profiles, Harry L. Ammerman, Darrell Clukey, and Gregory P. Thomas, ed.; Vol. 5, Methodology, Loring M. Carl, Gregory P. Thomas, Clark A. Smith, Kevin R. Morse, and Darrell Clukey, eds., and Vol. 1, Summary Report, by H. Del Schalock, Gregory P. Thomas, Kevin R. Morse, Clark A. Smith, and Harry L. Ammerman. For a less successful effort at the same kind of case studies with cross-case analyses, see materials produced in 1978 by the Documentatoon and Technical Assistance in Urban Schools project, sponsored by NIE's School Capacity for Local Problem-Solving Group.

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER TEN

October 1979

Harriet Spivak
Michael Radnor

The project reported herein was performed under Contract # NIE-C-400-76-0110 for the National Institute of Education, Department of Health, Education and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the National Institute of Education and no official endorsement of the National Institute of Education should be inferred.

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CHAPTER TEN

RESEARCH

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I. DEFINITION OF THE RESEARCH FUNCTION IN EDUCATIONAL R/D&I

The term "research" has been used rather broadly in the field of education, to include a wider range of activities than what is generally understood as the research function in R/D&I systems. Thus, OE "research" funding in the 1960s covered a number of different "research functions," including what we generally differentiate now into "development," "dissemination," etc.[1] School system "research" offices gather demographic and testing data on their student populations, publish summary statistics, and describe what they do as "research." Given this usage tradition, it becomes important for us to be clear at the outset as to what we do and do not include in our definition and analysis of the research function in educational R/D&I.

1. Research as Disciplined, Systematic Inquiry

We will be concerned in this analysis only with research that meets the criteria of "disciplined inquiry" -- the conduct of systematic empirical investigations or the application of disciplined qualitative inquiry approaches (e.g., historical, philosophical, anthropological and political science modes of investigation) to education-related questions. The research may be quantitative or qualitative. It may be conducted by researchers who identify themselves as "educational researchers" or as researchers working within a particular discipline (sociologists, psychologists, etc). As long as the research is of a disciplined, systematic nature and is focused on questions relevant to education, we include it within the research function in educational R/D&I.

*This chapter presents in summary form material that is expanded extensively in a subsequent draft of this volume, already in preparation.

however, we must restrict our attention to the more disciplined modes of inquiry about which a sizeable body of knowledge has already accumulated.

4. Types of Disciplined Inquiry

The literature includes several attempts to distinguish among types of inquiry modes that fall within the research function. The most widely used distinction is the one made between "basic" (or "fundamental" or "pure") vs. "applied" research. Dissatisfaction with this usage has prompted some analysts to replace the basic vs. applied teminology with such other distinctions as: "conclusion-oriented" vs. "decision-oriented" research[4] or fundamental vs. "problem-focused"[5] vs. "product-focused" research. However, though we recognize the limitations of the basic vs. applied usage, for simplicity we will use that terminology here.

We will be concerned in this chapter with basic and applied research. We will be considering other kinds of systematic inquiry in two other chapters in this analysis: product-oriented research and formative evaluation, discussed in our chapter on the development function; and decision-oriented research modes -- evaluation research (both formative and summative), institutional reserach, and policy research -- in our chapter on the evaluation function. Although all of these inquiry modes share certain features in common, they differ substantially in purposes, in personnel and institutional bases, in the effects of various political and/or organizational constraints, and, to a significant though lesser extent, in relevant knowledge and technology bases. These distinctions will become clear when we consider these other inquiry modes in subsequent chapters. For the remainder of this chapter, we will focus on basic and applied research only.

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II. ISSUES AND PROBLEMS IN BASIC AND APPLIED RESEARCH IN EDUCATION

The educational research enterprise faces many of the same dilemmas as research in other fields, especially other applied social science fields. There is, for instance, the universal issue of quality control, which takes on particular importance in education, where evaluations consistently show poor definition of educational research questions;[6] inadequate methodological rigor; inadequate grounding in theory; and low ratings of the quality of most educational research outputs.[7] There is also the omnipresent issue of appropriate methodology -- debated in education in terms of the strengths and weaknesses of experimental (or quasi-experimental) vs. the less controlled designs in the field settings in which most educational research is conducted.[8] A related issue concerns the inappropriate application of various statistical techniques in data analysis.

Several of these generic research issues that cut across all social science fields (and perhaps other sectors as well) are particularly pronounced in education because of the nature of the field's knowledge base, the nature of the demands made on the educational research community by external environmental forces, and the deep strains in relationships between researchers and practitioners. Instances of these generic issues that take on particular salience in education are: how to produce interdisciplinary cooperation; how to determine priorities between basic and applied research; and how to protect subjects and operational settings from unwarranted interference by researchers.

1. How to produce Interdisciplinary Cooperation

Education is a conjunctive domain of knowledge -- i.e., a field that focuses the perspectives of several disciplines on understanding and solving certain social problems.[8] Since as many as twelve (or more) disciplines converge on inquiry in education,[9] interdisciplinary cooperation and cooperation between educational researchers and researchers in the other disciplines become all the more important -- but no less easy to attain.[10]

2. How to Determine Priorities Between Basic and Applied Research

The debate between basic and applied researchers in education is phrased in terms of the weaknesses of the field's knowledge base (how little or how much we know at this time to guide program or product development) vs. the immadiacy of the problems in need of solution. Thus arguments can be made in support of basic research at the expense of applied research -- for example: the contention that R&D programs at this time are premature and ill-conceived because the basic knowledge base is inadequate; the argument that applied work is ineffective in solving problems because it is framed in terms of existing conceptions that are inadequate and will remain so until basic research produces fundamental new insights that affect the way we think about problems as well as the knowledge and technology we apply to them. However, other persuasive arguments can also be made for applied research at the expense of basic research -- for example: the argument that we already know a great deal that is useful for solving pressing problems that cannot await maturation of the field's basic knowledge base; or that effective solutions can be developed if the available knowledge base is effectively transformed and structured in a manner that facilitates application.

If high levels of funding were available for educational research, the issue of determining priorities between basic and applied research would be of less consequence. However, federal funding of educational research (both basic and applied) has generally amounted to little more than 10% of federal funding of all educational R/D&I activity. The federally funded research total for FY 1975, for instance, was only $48.5 million,[11] a rather modest sum for all areas of fundamental research relevant to education and all forms of applied research.

Strong criticisms have been made of basic research funding in particular -- that it has been relatively small in scale (and able to provide support for an inadequately small percentage of the proposals submitted); has not been designed in accord with any overall basic research strategy; and has lacked either continuity or high visibility.

The data gathered by the National Academy of Sciences Committee on Fundamental Research Relevant to Educationa is useful to illustrate the concerns of the basic research community. According to their report:[12]

a) Research Support as a Percentage of Total R&D Budget: Federal agencies that sponsor R&D relevant to education differ in the percentage of their R&D budgets they allocate to research. In some, such as the Department of Defense or the Department of Commerce, as much as one-third of their R&D budgets go to research. Their estimates for OE and NIE, however, are that less than 10% of the funds go to research while more than 50% goes to demonstrations and around 25% to dissemination.

b) Basic Research Support as a Percentage of Total Research Support: When the data are considered for all federal agencies that sponsor R&D relevant to education, approximately one-third of total research support goes to basic research. The percentage is even smaller (22-29%) when attention is restricted to the agencies directly concerned with research in education, and smallest sitll (15-20%) when one examines the data for OE and NIE alone.

c) Basic Research Support as a Percentage of Total Education R&D Budget: The data for all federal agencies engaged in social research show that 11-12% of total R&D funding is allocated to basic research. However, when the data are examined for only those agencies concerned with education, only 3-4% of R&D funding is allocated to basic research. When attention is restricted to OE and NIE alone, that figure is further reduced to 2%.

d) Fundamental Research Support Under NIE Compared to Fundamental Research Support Prior to 1972: Worst of all, from the perspective of the research community, research was receiving less support from NIE, both in absolute and relative terms, than it was receiving prior to the establishment of NIE which was explicitly mandated to strengthen the scientific and technological foundations of education. In 1968, research was receiving approximately one-third of total federal R&D funding, basic research represented approximately 13% of the research budget across federal agencies, and OE allocated approximately 7% of its R&D budget to basic research. In 1975, research was still receiving more than one-third of R&D funding across federal agencies, but in OE and NIE together, research was receiving around 10% of R&D funds and basic research was receiving 2% or less. Not only the percentages but even the dollar amounts available for basic research in education declined between 1968 and 1975.

In short, the argument made by the NAS committee was that federal support for educational R&D activities has increased in recent years but fundamental research has not only not shared in this growth but has even suffered a decline in available dollars.

There were many high hopes for NIE in connection with basic research in the months prior to its creation -- but NIE has not become the think tank of eminent scholars that NIE proponents envisioned and argued for. Instead, funding problems forced cutbacks in the small basic studies unit within NIE; allocations for basic research grants remained small (and were eliminated altogether for a while);[13] and earlier initiatives to strengthen basic research (e.g. the four-year funding of COBRE, the Committee on Basic Research in Education) have not been continued.

The COBRE project was of particular importance. It had an eminent organizatonal setting (the National Academy of Education and the National Academy of Sciences - National Research Council). Eminent scholars served on the Committee. Its task was "to identify problems to be attached by basic research in education and to develop and try out plans and procedures for stimulating and supporting such research." It had moderate success in attracting both established and younger scholars from the social sciences to basic research in education. Still, it was discontinued.[14]

Clearly, basic research in education needs to be strengthened. But, as we shall see shortly, applied research may require even more strengthening and capacity building. Until we learn considerably more than we know now about the requirements for a health basic research capacity <u>and</u> a healthy applied research capacity in education, we will lack a sound rationale for determining the appropriate balance between basic and applied research funding in educational R/D&I.

3. Ethical Issues

Ethical issues surrounding relationships between researchers and human subjects take on added meaning in education where the human subjects are often children and where relationships between researchers and practitioners are often strained. In educational research settings, the need to protect subjects from harmful effects of experimental treatments or from invasion of their privacy is a very important issue, and a considerable amount of concern and policy thinking has already been directed at this issue.[15] These direct ethical issues raise further issues about the amount of control a researcher can have over the conduct of his own inquiry -- e.g., the role of the practitioner in defining the problem to be investigated; the amount of manipulation of "treatments" to be permitted in an operational field setting; the needs of researchers fro a stable program stimulus vs. the needs of program personnel to keep changing their program in terms of changing needs and understandings of what they are doing.

III. THE CHANGING CHARACTER OF THE EDUCATIONAL RESEARCH COMMUNITY

In addition to these various generic research issues, there are a host of new issues that have emerged over the last decade and a half in the education sector as the character of the educational research enterprise has been transformed by research funding policies of federal agencies.

1. The Small-Scale Research Mode in Academic Settings

Until the mid-'60s educational research was an activity carried out by a relatively small number of individual researchers who were based in the universities; operated with a great deal of autonomy in defining problems and conducting investigations; devoted a small proportion of their time to research; were oriented primarily to publishing research findings that might add to our understanding and knowledge about educational phenomena; and were regulated primarily by a peer group review system that allocated rewards primarily in the form of prestige and recognition within the scientific community.[16]

2. New Institutional Arrangements

Developments of the past decade and a half have transformed educational research. The educational research community has grown rapidly in numbers and in diversified institutional bases.[17] Although almost all basic research is still carried out in the universities and some applied work is done there as well, non-profit and for-profit research corporations have emerged as a strong competitive force in securing applied research contracts from governmental agencies.[18] Consequently, more and more of this research is being done outside the universities, with serious consequences for research training; for information flow and the cumulative development of the field's knowledge and technology base; and for the manner in which (and the extent to which) research findings get to be disseminated and utilized. The new institutional arrangements for the conduct of research have turned research into a full-time pursuit for a large portion of the research community. Of even greater consequence, these new arrangements have had a significant impact on the nature of educational research and the educational research community. These new arrangements have produced new patterns of research functioning (e.g., research teams rather than individual researchers). There are new modes of research management and new constraints on researchers -- i.e., bureaucratic, mission-oriented research management that limits the individual researcher's autonomy in both defining research problems and conducting inquiries.[19] There are new research subcultures with wholly new systems of rewards and controls that weaken the impact of the disciplines on the conduct of inquiry -- e.g., political and bureaucratic norms are competing with an (for many) replacing professional norms; political influence and economic incentives are replacing scientific recognition as rewards; and agency acceptance and utilization of research findings are replacing peer review of scientific quality as the dominant controls.[20]

3. New Kinds of Accountability Issues

The new prominence of educational research, and the amount of public funds flowing to it, have posed new kinds of accountability issues that may be harder for researchers in the education sector to resolve than researchers in other sectors which have stronger knowledge and technology bases.[21] The Congress has been demanding public accountability for an immediate payoff for its investment in educational research -- without any realistic appreciation of the extended time frame needed to produce results in research in general and in educational research in particular.[22] Thus, we find a "Catch-22" type of situation. On the one hand, to obtain funding, researchers must provide some promise of a payoff -- regardless of the fact that research by definition involves a not ~~insignificant degree~~ of uncertainty. On the other hand, to make promises which cannot be fulfilled may result in the researcher being funded -- but even more importantly, such unfulfilled promises lead inevitably to public disillusionment and a worsening of the political environment of the research enterprise.[23] The proper stance for educational researchers to take in relation to government agencies and the kinds of research outputs they should provide (i.e., should they attempt to provide solutions, approaches to defining problems and thinking about solutions, or information about the likely or obtained effects of alternative solutions under consideration by policymakers?[24]) have therefore become matters of serious debate among educational researchers and social scientists in general.[25]

IV. THE FUTURE

Despite frequent calls in recent years for a strengthening of the educational research community and more field-based initiatives to structure the national research agenda for education,[26] the educational research community remains diffuse, politically weak, and largely reactive to federal initiatives designed by government bureaucrats who are generally not members of the research community. The AERA has recently organized a Governmental and Professional Liaison Group to lobby in Congress and among federal agencies in the interests of the educational research community.[27] However, it is still too early to assess whether or not these efforts have significantly improved the political position of the research community or created conditions conducive to more active research community leadership on research issues.

The strengthening of the educational research community in the future may depend on collaboration among the leadership of the research community and the key federal agencies and other major sponsors of educational research, with initiative perhaps remaining still with the federal agencies. Our analysis of what is needed is based on consideration of the somewhat distinctive requirements of basic and applied research and the current state of development of the institutional and personnel bases for conduct of the basic and applied research functions in education.

1. Basic Research

A. Assessment Basis

In assessing the requirements for strengthening basic research in the education sector, it is important to recall the interdisciplinary nature of educational research. On the one hand, much of this basic research is being performed within the various disciplines that are relevant to education. However, education is a subsidiary concern of these other disciplines. On the other hand, there is basic research that is done within the field of education, by researchers who have committed themselves primarily to the derivative disciplines (educational psychology, educational sociology, etc.). These researchers are trained in and committed primarily to education as a field of study. Whereas researchers who identify themselves with the parent disciplines may well move in and out of the field of education -- studying education-relevant questions for a time, then moving to other questions of concern to their work that do not impinge on education, then moving back a few years later into more education-relevant work, etc. -- researchers who identify themselves primarily with the field of education provide the field of education with a more stable central core. It is this latter focus which is our primary concern here because of the importance of having a basic research function whose primary and ongoing focus and commitment is on the field of education per se -- while at the same time recognizing and utilizing important and relevant basic research in other fields.

Basic research is an uncertain, unpredictable and highly creative undertaking that is very sensitive to threats to its climate and to the quality and stability of support and funding, and is highly dependent on its roots in the fundamental disciplines. Its outputs are knowledge, and it is only generally in the long-term that we can assess its practical contribution.[23] And, given its inherent uncertainties it becomes hazardous to attempt to predict the areas in which such outcomes will occur. But without it the well of new thinking frequently runs dry. It is therefore vital that a healthy and mature R/D&I system will have developed and maintained a substantial, high quality basic research component.

Such a component cannot be built quickly. The rate at which quality basic research can be expanded is limited by the size and quality of its existing centers of excellence (which may range from a single outstanding researcher to a team of such researchers). To pump more funding into this endeavor than such centers can usefully absorb can only lead to waste and disappointment. Future growth is (and will be) limited by past investments in creating and supporting a central core of basic research having many centers of excellence. The major problem of basic research within education as a field of study per se has been as we noted in the very weakness of this central core.

Assessment of the basic research function will need then to be based on:

a) The size and quality (based on the reputation of institutions and personnel) of the central core of the basic research function -- most specifically on the size, growth and stability patterns of identified centers of excellence. An important indicator will be the ability to attract and hold top flight researchers.

b) The number of new centers of excellence seeded and taking root over successive (rolling) 3-5 ~~year~~ periods.

c) A measure of the supportiveness of the climate - in terms of funding growth and stability over several year periods.

d) Measures of the quality of the linkage to and reputation of basic research in education and its more fundamental parent disciplines.

e) Over long (10-20 year) time spans, an assessment of major substantive contributions to knowledge coming from basic research in education.

B. Current Status

Basic research in education is to be found in two types of settings. Generally, the basic research carried out in schools of education (in derivative disciplines such as educational psychology and sociology) boasts few centers of excellence and much mediocrity. A different picture emerges when one examines the research carried on in discipline-based university departments such as psychology and sociology. Excellence and valuable contributions to knowledge are to be found, but what has been lacking here has been a primary and continuous commitment to education. The interdisciplinary character of educational research has added to the diffuseness of the research enterprise by making communications and information retrieval (from the large variety of publication sources) very difficult. Altogether, this has added up to a basic research community in education that has been to date unstable and amorphous. It makes system building in this area a major requirement and a critical consideration in funding programs.

At the same time, the general climate for basic research in education as for other (especially social) areas of basic research has been far from supportive. This negative climate has been particularly intense for education which has been hard put to point to more than a relatively small number of significant developments that are traceable to basic research.[29] The low prestige with the general public and with Congress and the associated unreliable funding have made it hard to attract strong talent and this has acted as a major constraint on building the central core.

C. Key Needs

In light of the above summary analysis of the distinctive requirements of basic research and the current state of development of this function in education, the key need would seem to be for a consistent, continuous, stable process of system building. This would include:

a) identifying existing centers of excellence;
b) facilitating the establishment of additional centers of excellence;
c) facilitating the growth of these centers, existing and new;
d) facilitating improved information exchange and retrieval mechanisms;
e) providing stable, long term funding.

2. Applied Research

A. Assessment Basis

Applied research *is* research and therefore shares with basic research a high level of uncertainty and unpredictability. Thus, researchers in particular treat applied research in a basic research mode. But it is also *targeted* research. Thus, funders and users often assume it to have the level of certainty and shortness of time line more appropriately associated with development. This deceptiveness and the consequent inherent tension makes applied research subject to considerable instability misdirection and mismanagement, and consequent misdirected assessment.

Researchers frequently redefine and bend applied research into basic research modes. In particular, they often attempt to undertake projects on smaller scales than are required by the nature of the problems, which often require the efforts of large-scale interdisciplinary and empirically based team programs. This syndrome is often combined with attempts to oversell the timing, probability and impact of outcomes in order to obtain funding. This often succeeds with funders simply because applied research projects do appear to have practical, attainable outcomes. All of this creates an environment that tends to be unattractive to many of the best researchers.

On the other side, users and funders, haveing been persuaded to fund such programs because of these very expectations of near-time benefits, become frustrated by not only the lack of delivery but also by the shifting targets, time and cost patterns which are inherent in the uncertain research process.

Another important dimension of this tension lies in the problem of need identification. On the one hand, the objective is to work on important and timely problems that require solution, and this tends to be the prime inducement for the users and funders. On the other hand, a researcher is required to maintain the criteria of researchability, and may therefore so significantly redefine the research question to make it "researchable" that the effect is to significantly limit the utility of the project's findings from the user perspective.

These sources of tension become magnified when one recognizes that the cost and scale of applied research tend to run orders of magnitude higher than what is typical of basic research.

Assessment must therefore be based on judgments of:

a) The quality and appropriateness of the institutions performing this function: Are they capable of mounting the required large scale interdisciplinary efforts? Are they attracting and keeping top quality applied researchers? Are their programs and projects considered to be of high quality, important to practice and on truly researchable problems?

b) Whether applied research is emerging as a definable entity, differentiated from basic research and development.

c) After a time lag that reflects several years of sustained system building, an evaluation of the rate and impact of outputs.

d) The climate for applied research in terms of both support patterns and receptivity to its outputs.

B. <u>Current Status</u>

Most of the research that is carried on in education appears to be what might loosely be defined as the applied type, much of it unfunded and small-scale. The volume of studies produced may indeed be large -- but being of this small-scale, scattered and fragmented quality, these have been subject to many questions of quality. It is evident (as mentioned earlier) that there is substantial lack of differentiation in education between what can truly be classified as research and various other activities (e.g., demonstration projects, social bookkeeping, etc.); great weaknesses in defining researchable problems; considerable fuzziness in differentiating applied research from basic research and development; and the previously mentioned tendency to oversell such projects.

Most applied research in education is carried out in either universities or large-scale R&D institutions in the private or quasi-pbulic sectors.

Where this work has gone on in universities, there has been a tendency to perform applied research in a basic research mode. This is not surprising given the socialization and prior training of university researchers and the social and publication pressures under which they operate. Generally, universities find it difficult to assemble the minimum critical mass of effort needed to undertake large-scale applied research projects. As a consequence, they have tended to scale such projects down and/or to assemble ad hoc teams that lack long-range stability. With this has come the unfortunate tendency for researchers to move in and out of this part of the field which has mitigated against system-building requirements.

Large scale R&D organizations should have been, and to some degree have been, more suitable sites for such programs. However, two important problems have limited their potential success. Firstly, most of these R&D organizations have not been able to promise a stable career path to researchers, thereby greatly limiting their ability to attract and hold first-rate researchers. Secondly, federal funding practices in the late '60's shifted the character of many of these institutions away from applied research and reshaped them into development organizations in accord with federal priorities at that time for product-centered, quick-impact strategies.

As a consequence of the above conditions, education has, in fact, seen very little large-scale applied research. Therefore, this has to be seen as an area that needs to be put together at this time in its own terms and not be thought of as a form of advanced development or downstream basic research.

A number of other problems in educational applied research were previously implied, but require further explication. The climate for such research has been, perhaps, even more negative than that described above for basic research. This has been so precisely because it seemed to hold out more promise of impact and raised expectations than could have been satisfied -- given the inherent time frame and the weak state of the area. Relatedly, need identification, which had been researcher-driven up through the mid-'60s, became system-driven by users and funders in an overreaction to this state of affairs. As with basic research, funding has been relatively limited.

C. Key Needs

Applied research in education, then, must be seen in a system-building mode.

a. It will be essential to locate those centers of excellence capable of performing large-scale applied research.

b. Such institutions will need to be provided with the kind of long-term stable funding that will permit them to attract and retain top-flight staffs of researchers.

c. It will also be vital for the lead educational funding agencies to help practitioners and the Congress understand the nature and requirements of applied research to: understand that project selection requires the determination of what is researchable as well as what is important; recognize that the present lack of capacity demands a period of institution-building before the promise of the area can begin to be fulfilled; and understand that such institution-building will require an ongoing and long-term commitment.

V. DEVELOPMENT OF RESEARCH FUNDING POLICIES

Research funding is on the increase in the education sector. Indicative of this is the NCER resolution passed in 1977, mandating an increase in NIE support for fundamental research such that at least 20% of NIE's budget would be set aside for fundamental research by FY 1979, rising to a set-aside of at least 30% by FY 1985.[30] We have argued elsewhere against this approach to determining funding allocations.[31] Instead, we have called for a perspective that takes into account a number of factors such a priori set-asides ignore -- for instance, the capacity of the existing high quality research base to productively use different levels of funding, the rate at which the quality research base can be expanded, the need to balance funding allocations across all functional areas that make up the educational R/D&I enterprise, the need for a balanced rate and level of development across each of these areas, etc.

Clearly, the research function in education requires substantial strengthening. And probably an increase in research funding was in order. However, we would hope that future policy decisions of this kind will take into account long-term, systemic questions; that the expansion of the research function will be planned, orderly, and targeted at centers of excellence; and that existing capacity will be protected and nurtured in a manner that would leave it less exposed to the vagaries of NIE's budget appropriation from Congress.

What has been lacking is clear policy thinking directed toward establishment of an overall research strategy for the educational R/D&I system. This would seem to be a matter that warrants priority attention. The NCER Resolution mandating increased support for fundamental research suggests that NIE's policy making body has come to acknowledge the importance of the research function for the overall health of the educational R/D&I system. It would now seem essential to invest some resources in the design of more appropriate research funding policies for insuring the healthy development of the research function.

FOOTNOTES

1. Office of Education, Educational Research and Development in the United States (Washington: OE, 1969),, pp. 125-128.

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EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER ELEVEN

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CHAPTER ELEVEN

THE DEVELOPMENT FUNCTION

CONTENTS

In the early years of funding for education R/D&I, there was considerable enthusiasm for the notion of applying R&D models (i.e., research-linked development) to the solution of educational problems. Again and again, the literature echoed the theme that development was the critical missing link needed to translate findings from research and innovative ideas from practice into usable forms that could be implemented widely in schools across the country.[1] Research was having little impact on practice, it was argued, because research findings tend to be too general to apply directly to the solution of practical problems: research generally does not make information available in a form that is readily usable or suggests easily implemented solutions to perceived problems. And innovations devised by practitioners rarely have significant impact beyond their site of origin because they are rarely developed or packaged sufficiently to permit adoption or adaptation by others. Institutionalization of the development function was expected to overcome both barriers to wide scale educational improvement.

As envisioned by R&D proponents, developers were to become the "engineers" for the field of education. They were to perform the key translation, elaboration, and packaging roles carried out by engineers in industrial and military settings. And they would carry out these functions in specialized institutions thought of by some early proponents as analogous to the great national laboratories in the fields of health, defense, and atomic energy. Educational development was to become "a new discipline for self-renewal,"[2] borrowing engineering procedures from industrial and military settings and adapting them to the field of education. Once education had received this infusion of systematic procedures from technological fields that were achieving such goals as putting men on the moon, surely wide scale improvement of educational practice could be expected!

When, only a few brief years later, these lofty expectations were still unfulfilled, much of the earlier interest in educational R&D dissolved.

The federally funded labs and centers, created as the institutionalized settings for R&D, had to fight for their survival -- nearly half lost their funding and went out of existence. Though the remaining labs and centers now seem to have a secure niche in the federal educational R/D&I funding picture, this has required transformation for some, entailing greater orientation toward the dissemination function, for instance, and somewhat less emphasis on product or program development. There appears to be less mention of "R&D" or even "development" in the literature and in usage patterns in policy circles. Even NIE, the federal agency created "to build an effective R&D system," has apparently demoted development to a lesser priority in its funding policy, placing support for full-scale development work behind a) funding applied research, b) facilitating development work of others, and c) sponsoring only prototype development to achieve the agency's social policy objectives.[3] More and more, attention seems to be shifting away from the engineering model of R&D and toward the KU end of the spectrum -- increasingly larger shares of the total educational R/D&L dollar appear to be going to dissemination, implementation support, and building operating system capacities for the less rigorous forms of local, practice-based development.

What has happened over the past decade or so to change the climate surrounding the educational R&D enterprise? What went wrong, and why? What directions and trends are apparent? What have we learned from the experience that may be usable to strengthen the enterprise in the future?

The analysis which follows considers, first, the rather sparse literature on the development function in education and raises questions about how we may learn from the experience of the past decade given how little inquiry, analysis, or even straightforward documentation is available to date. Second, we consider a number of modes of development activity: (a) the conventional form of practice-based/practice-related development characteristic of education prior to the emergence of R/D&I in the mid '60s; (b) the rigorous engineering model of development borrowed from industry, the focus of attention in educational

R/D&I in the late '60s and early '70s; and (c) the exemplary practices approach of local, practice-based development linked to various validating, packaging, and/or dissemination mechanisms, an approach which has been attracting increasing attention as enthusiasm for the rigorous engineering model of educational development has cooled. We note the distinguishing characteristics of each of these models and the strengths and weaknesses of each in the education sector. Finally, based on this analysis, we point to a number of policy options that might be considered for strengthening educational development, and consider what more we would want to know as a basis for choosing among the available options in designing workable approaches to strengthening educational development in the future.

I. THE LITERATURE OF EDUCATIONAL DEVELOPMENT

A. Paucity of the Literature

Considering the pivotal role of the development function in the educational R/D&I strategy, the paucity of literature on educational development seems somewhat astonishing. What little is available has generally been produced by staff members of the regional laboratories (particularly the Far West Lab), and many of the same pieces are reprinted in one or another collection of articles on the development function.[4] We are indebted to those who have published these pieces for providing us with what little information exists in print at this time on the development process. The brunt of our criticism is not directed so much at what is there in the literature as it is concerned with what is not in print for others to read and analyze. There is relatively little process documentation by participants or by third-party researchers; relatively little in the way of inquiry into what is being done, why, and how, with what outcomes; little analysis of the nature of the development function and its requirements, conditions conducive to high level functioning, etc.

The available literature is probably somewhat larger than what we have been able to gather. We are, for instance, aware that the University of Pittsburgh R&D Center (LRDC) subjected itself to the scrutiny of an in-house sociologist for several years and that some analyses have been forthcoming.[5] And we are aware of at least one methodological volume on development procedures that we have not been able to review.[6] But aside from these sources, it is likely that we have seen most of the existing literature. And what we have seen, unfortunately, would be of relatively little use for giving a novice developer much insight into how to carry out the development function. The literature raises some useful questions that should be of concern to top-level R&D management.[7] But even here, one would hope to see greater richness of descriptive detail and more analyses of the nature of development work in education and the difficulties that have been encountered.

B. Categorization of the Available Literature

The available development literature can be categorized as follows:

1. calls for development as the missing function needed to transform research findings and exemplary practices into usable packages for wide scale dissemination;[8]
2. definitional pieces, describing development processes and outputs in terms that distinguish it from conventional developmental activity or from research,[9] or that further define types of development (e.g., product development vs. change process development);[10]
3. analyses that consider development in relation to other functions such as research or dissemination or evaluation, either describing ideally what the relationship should be or describing the nature of the integration as it has unfolded in particular projects;[11]
4. reproduction of documents generated in the course of individual development projects, published in the hope of providing the reader with some insight into the thought processes and activities of the developers in carrying out a particular project;[12]
5. case studies, either by participants in a project[13] or by third-party researchers studying individual projects and carrying out cross-case analyses,[14] perhaps the most useful items in the available literature;
6. our earlier analysis of the nature of the development function and its requirements, based on examination of how the development function is carried out in other fields such as aerospace, industry, health, and law enforcement;[15] and
7. our earlier overview analyses of the development function in education based on the available literature, personal experience, and impressionistic evidence.[16]

We will draw heavily on our earlier analyses in the remainder of this chapter, updating the analysis wherever this seems warranted by new circumstances or new information.

C. Needed Literature

What the field would seem to need is considerably more documentation and analysis of the development process -- the tasks and activities carried out; the skills and competences required; the often difficult interpersonal communication, and organizational problems inherent in large-scale development projects generally requiring heterogeneous skill mixes, complex multi-unit organizational forms, and difficult collaborative relationships among developer organizations, user settings, sponsoring agencies, etc. Although our description here focuses somewhat on the need for greater understanding of the systematic R&D mode, we would be equally interested in seeing studies done of development work of both the practice-based practice-related and mixed modes described later in this chapter.

Ideally, we would like to see such analyses carried out by third-party field researchers, spending long periods of time working with ongoing development projects (both some that are succeeding and producing high quality work and others performing less well). Case studies with cross-case analyses would be highly useful. The case studies of development projects included in the Oregon Studies are highly useful examples of what can be learned from such a format.[17] However, we would like to see the kinds of process documentation that require living with a project for some time -- perhaps a year or more.

Given the probably high costs of such a project, and its likely low priority given the current deemphasis on the development function, a less costly alternative to provide the needed information might be to use oral history techniques to gather rich, descriptive detail about the development process from developers who have actively carried out development projects over the past

II. THREE BASIC OPERATING MODES IN EDUCATIONAL DEVELOPMENT

Depending on how one defines educational development, it is either one of the oldest or one of the newest R/D&I activities in the education sector; virtually all products used in the education sector are the outputs of development work or relatively few are. The core of developmental activity is the translation of a conception into a useable product or program. Generally in the field of education, the conception involves some specific instructional objective and a particular approach or strategy for achieving that objective. The translation process tends to involve the selection and sequencing of a number of learning experiences aimed at achieving the particular instructional objective. More often than not, the translation process involves the design of materials of various kinds to support the instructional process.

As long as there have been teachers and schools, educators have been devising teaching approaches and preparing instructional materials, though not using the term "development" for what they were doing. More recently, the engineering model of development borrowed from industry added several distinctive features which transformed the nature of this development process and shifted its locus from the professional educator and the school setting to specialized development organizations and personnel identified as "developers" external to the operating system, creating new kinds of products, and also new kinds of problems in securing the adoption and use of these outputs back in the classroom. A third mode of development combines elements of both the earlier variants, both school-based development of innovations and external verification, elaboration, and packaging for dissemination by a combination of state and/or federal level bodies and specialized development organizations.

There are, then, basically three different operating modes through which the development function is carried out in education. For convenience, we shall describe the three modes in terms of the settings

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1. Practice-Based/Practice-Related Development (also referred to in the literature as "conventional development," "local R&D," or "school-based R&D").

A. Settings and Personnel

Traditionally, the design and development of instructional strategies, programs and materials have taken place in practice-based and practice-related settings. The traditional developers of educational products and programs have been classroom teachers and curriculum specialists working in LEAs, SEAs, or the new ISAs, or in such practice-related auxiliary organizations as schools of education, publishing houses, or commercial suppliers of audio-visual or multi-media instructional materials. On occasion, as in the NSF Course Content Improvement Program of the late '50s and early '60s, eminent university scholars joined the ranks of educational curriculum developers, participating in impressive efforts to improve K-12 level curricula and instructional materials in the sciences and mathematics.[18] There were some less successful programs in other fields as well, notably social studies and English.[19]

B. Funding Sources

Generally, traditional development work has been funded out of the operating budgets of LEA's and SEAs or the development budgets of the publishing houses and commercial suppliers. Over the past two decades, however, there has also been a substantial infusion of federal categorical funds to support specific kinds of development work. NDEA (the National Defense Education Act) and CRA (the Cooperative Research Act) in the late '50s and early '60s supported work in foreign languages, English, and social studies, for instance, mostly in university research settings. NDEA funds also gave a major boost to the audio-visual industry, providing substantial sums for school systems to purchase audio-visual equipment and materials. At the same time, NSF money supported such important curriculum revision projects as PSSC physics, BSCS biology, CHEM chemistry, and SMSG mathematics, to name only a few.

Beginning with ESEA (the Elementary and Secondary Education Act) in 1965, substantial federal funding has been going directly to LEAs to support the development of programs to improve the achievement of disadvantaged students (Title I) and to support the development and demonstration of educational innovations (Title III). Additional categorical federal funding has gone to LEAs to support development work targetted at assisting handicapped students and bilingual students. Some states provide parallel state funding for categorical programs, especially those targetted at disadvantaged students.

C. The Development Process

The development approach used in these settings is generally characterized by a number of distinctive features:

First, the development process tends to be somewhat casual -- a creative teacher writes down her ideas in rough form for her own use; a curriculum committee of a small number of teachers spends a few weeks over the summer revising the curriculum for instruction in a particular subject; the small curriculum staff of an LEA or SEA prepare a new curriculum guide; the author prepares the draft of a textbook in his spare time and works with an editor from a publishing house to ready it for commercial distribution; a number of university professors and their assistants devote a small portion of their time each week to a curriculum project that elaborates a particular conception. What is distinctive is the casualness of the enterprise, the absence of much in the way of disciplined inquiry accompanying the work.

Second, evaluation of the outputs of this development process tends to be equally casual and informal; it "places little burden of proof on the product."[21] Field-testing is non-existent or minimal -- "casual tryout"[22] at best. Whatever evaluation and revisions are made tend to rest on criteria of face validity (e.g., self-criticism, teachers' subjective perceptions and reactions; expert judgments, etc.) rather than measured effectiveness in achieving prespecified impacts. Even where some revision does take place, there is not likely to be an extensive recycling of the development-revision sequence.

Third, the personnel involved tend to be relatively few, and whatever skill mixes are present in a development team tend to be relatively homogeneous.

Fourth, management is generally informal and highly flexible.

And finally, because of all of the above, costs tend to be relatively low.

There is of course significant variability within this mode. There are obvious differences of scale and sophistication, the range let us say from a single teacher working alone on something for her classes to the university group of several professors and graduate students collaborating with the editorial and production staff of a commercial publishing house. But in addition, other differences should be noted.

For instance, though generalization based on impressionistic evidence is somewhat risky, the work done in school systems and in universities seems to differ somewhat in the origin of conceptions and in the decision criteria used in the selection and sequencing of learning experiences. In school systems, both the origin of the conceptions and the decisions made tend to be somewhat intuitive. And the focus of attention seems to be on the content to be conveyed rather than on conceptions of how teachers go about providing instruction. The development work of university-based curriculum specialists, in contrast, is more likely to reflect particular theories of curriculum or instruction. But even here, more often than not, the selection and sequencing of learning experiences tends to reflect theoretical considerations rather than experimentation in classrooms or analysis of data on implementation processes or conditions or student impact.

Development processes and outputs also differ depending on whether or not a given product or program has been developed with the intent of wide scale dissemination. Where textbooks or materials packages are being developed for large-scale, nationwide dissemination (as would be the case in a publishing house or in many university curriculum projects), an effort is usually made to include implementation supports in the form of teachers' guides, testing materials, etc. Where materials are developed locally within the operating system, for use by a single teacher or group of teachers in a single school or district, far less of the implementation process is likely to be committed to print or captured in media presentations. In such instances, the state of "development" of the materials or strategies remains inadequate to permit use outside this small originating group. Critical implementation information about what works, why, and how -- information carried around in the head of the originator of the project -- is not provided to assist others. Generally, these locally developed innovations are not disseminated. But in cases where wide scale dissemination is attempted as an afterthought, without adequate attention to dissemination or implementation concerns during the development process, these innovations tend to have minimal success. The reason, simply, is that the development work was not carried far enough to permit the innovation to be implemented easily and effectively by others.

Regardless of these variations, what is most distinctive about this mode of development is the casualness of product evaluation and revision following initial preparation of the development outputs, and the consequent low cost.

D. Outputs

It is difficult to characterize or assess the outputs that have been produced over the years through this mode of developmental activity. The output has been enormous. Its variability is considerable, from commercially published textbooks to an individual teacher's lesson plan. And most of all, the task is made particularly difficult by the relative "invisibility"[23] of this output -- most locally developed materials are to be found in teachers' files or supply cabinets, not in any central depositories or materials centers or dissemination pipelines.

One's assessment of this output is likely to be dependent on one's location (inside or outside the user system, in an innovative district or a more traditional one) and one's point of view (for instance, an educational reformer looking for evidence of extensive innovation or a practitioner looking for useful materials that meet particular perceived needs).

Clearly, though, an important point to be underscored is that generally this output is used, especially the commercially developed products and the materials prepared by practitioners for their own use. Although the number of students exposed to each set of locally developed materials may not be high, the per student cost is probably quite low -- a point in sharp contrast to the high per student costs of many of the outputs of the specialized development organizations which we shall consider shortly.

In some instances, as for instance the science and mathematics curricula produced by university scholars with NSF funds, the number of students using the materials is especially high. Therefore, though these projects cost considerably more than most development work of the practice-based/practice related variety, given the extensive utilization histories of their outputs the per student costs are probably still quite low.

E. Strengths/Advantages

Practice based and to a lesser extent practice-related development have a number of strengths, especially in comparison to the engineering mode of development we shall turn to shortly.

First, the costs are relatively low.

Second, this mode of development is closely and effectively linked to the user system. The programs and materials that are produced are responses to perceived user needs or problems. This is especially true in cases where the developer _is_ the user or is at least a part of the user system. But even where the work is done in practice-related settings, what are thought of (not always correctly) as close and ongoing relationships between practitioners, on the one hand, and personnel in schools of education or commercial publishing houses, on the other, are assumed to increase the likelihood that the development process will be responsive to the user's felt needs. Therefore, especially in the case of practice-based development, little or no marketing effort is required to persuade users to adopt or use the materials produced.

Third, where development work is carried out for local use, it is likely to reflect user system conditions, teaching styles, values, etc., the very factors that often act as barriers to adoption of externally developed innovations, or make it necessary for externally developed innovations to be adapted to meet local needs and requirements.

F. Weaknesses/Disadvantages.

There is also a number of weaknesses or disadvantages to this approach. The critique focuses on such problems as the lack of evaluative information provided by this process, lack of sophistication in the skills of the developers, poor documentation of the outputs produced, difficulties in packaging locally developed innovations for use elsewhere, substantial problems in achieving wider dissemination and diffusion, and, finally, the argument that from a national policy perspective (for all of these other reasons) local development entails an inefficient use of scarce resources.

First, since this development process generates little if any empirical data on degree of effectiveness of the product or program, or its effectiveness under varying conditions, it is difficult to make judgments about whether a given output works, for whom, under what conditions, whether it is any better than some alternative product or program that might be used instead, or perhaps most important of all, how it might be improved. If systematic research accompanied the development and refinement process, it is argued, our knowledge would be increased and we would be able to achieve better results.[24] Also, potential adopters would be in a better position to make informal adoption decisions.

Second, the argument has been made that there has been relatively little strong innovative development work in this mode because teachers and school systems lack the time and resources needed for high quality development work. They have neither the time nor the expertise to keep up to date on the latest research findings, or development state-of-the-art, or even innovations being developed in other school systems. Consequently, practitioners are constantly "reinventing the wheel." Nor do they have the time, resources, or expertise to carry out rigorous development work. Consequently, the work is nonrigorous and the results are mediocre.[25]

While the resource picture might be changed by providing LEAs and SEAs with the funds now given to specialized development organizations, the results, it is argued, would still be poor.[26] Practitioners would still lack the needed expertise and would continue reinventing the wheel. (Even if it were desirable for individual LEAs or SEAs to employ development specialists, the inadequate supply of trained developers would make this impossible.)

And such resources would not be expended efficiently: the nation could not expect maximum national impact for each dollar spent. Expenditures on local innovations generally produce programs for use only in the local setting. Additional funds would have to be expended to:

1. identify and disseminate high quality development work for use elsewhere;
2. gather and analyze impact data to provide potential adopters with a rational basis for decision-making;
3. elaborate and package local innovations sufficiently to insure that they could be used effectively elsewhere, replicating the results achieved at the initial development sites; and
4. disseminate the locally developed innovations nationwide.

Of course, one might argue that federal education agencies are forced to carry out most of these activities now in relation to the outputs developed by specialized development organizations, since things have not worked out quite as they were expected to in the operation of the rigorous engineering model of educational development. We shall return to this issue at a later point in the field is too new in the education sector for development personnel to have much (if any) formal training in development, they have generally learned their jobs through total immersion in the development specialty over several years. By background, they may come from practice settings, from universities, or in some cases from industry where they carried out development work in other fields. Many would seem to be development generalists with no particular specialization or else identified with "curriculum" in the broadest sense. Others may be curriculum specialists in particular subject matter fields. Still others may have specialties in design, testing, packaging, media, instructional technology, etc.

What distinguishes these developers from their counterparts in schools and universities ~~is their professional~~ orientation to the development function, the full-time allocation of their time to development work, and the manner in which their work is organized and managed. Individual developers in this mode function as members of generally large development teams, with highly heterogeneous skill mixes, and generally proceed in accord with the dictates of the engineering model of R&D.

Clearly, there is a considerable amount of development work carried on in these organizations that does not adhere faithfully to the rigorous model of the development function. But equally clearly, this does appear to be the model they are trying to use in planning and conducting their work.

B. Funding

What is also distinctive about educational development work carried out in specialized development organizations is that it is almost entirely funded with federal funds.

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The regional laboratories and university-based R&D centers were created by OE in the '60s for the specific purpose of carrying on educational R&D. They were created as new institutions on the assumption that none of the existing organizational forms could carry out the development function as an institutionalized specialty on the scale and in the tightly managed way that seemed to be required.

As the source of funds for virtually all of the operations of almost all of the labs and centers, Washington called the tune, and various messages from Washington have largely shaped systematic R&D as it has evolved in the field of education. By 1968 (and for a few years thereafter), it was made clear to the labs and centers that what was "in" was product development using the systematic R&D model.

When by the early '70s the federal sponsors of the labs and centers had become disappointed with the generally mediocre outputs of these institutions, development contracts were opened to broader competition. Non-profit and for-profit research and R&D corporations were organizationally suited to function as specialized R&D organizations and responded actively to the availability of funds. New corporations were formed, or existing corporations active in other fields added staff and/or organizational units able to handle contracts for development work in the field of education. Since the federal government was the prime source of development dollars in these years, federal policy and procurement decisions would seem to have been almost as influential in shaping the pattern of development work carried out in these organizations as it had been in shaping the development function in the labs and centers.

C. The Development Process

The engineering model of rigorous development work is characterized by a number of distinctive features that contrast it with the kind of developmental activity generally carried on in practice-based and practice-related settings.

First, and most often emphasized in the descriptions and definitions of this mode of development is the systematic nature of the procedures used to create the outputs. R&D is defined as the "systematic process of creating new alternatives that contribute to the improvement of educational practice;"[28] the systematic adaption of knowledge and technology;[29] "the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems or methods, including the design and development of prototypes and processes."[30] And, too, it is described in terms of providing "systematically derived information."[31]

What distinguishes educational R&D as a source of change is its experimental approach -- an insistence upon rigor in the formulation of problems and explanations and the systematic collection of empirical evidence for use in checking answers, developing products, and devising appropriate action.[32]

Second, included among the various systematic procedures used, and an essential feature distinguishing R&D from other forms of developmental activity is its incorporation of systematic methods of inquiry. R&D is often described as "research-based" or "research-linked" development. This usage emphasizes that the core activity is developmental but it also underscores the critical role of research in R&D processes. Research is described as often suggesting and leading to development work, and supporting development by indicating whether or not and how well an output works under various circumstances, how much better it does or does not operate with one or another revision or variation, etc. At the same time, the research-development linkage may flow in the reverse direction: research may not only lead to or support development work but also development may suggest needed research to uncover why things are or are not working and how a product may be further refined, etc. A key trait distinguishing R&D outputs from those of conventional developmental activity, then, is that R&D outputs are carefully tested products that are supported by a sound research foundation.

Third, development work in this mode is directed toward achieving prespecified outcomes known or estimated in advance. The objective is generally stated in the form of performance specifications. The goal is to produce an output that will perform predictably, to a prespecified degree of success, under specified conditions. Development work on the product continues until it performs as as specified. What distinguishes the output of systematic R&D, then, at least in terms of the ideal model, is that the output is expected to perform with a "known degree of success" in bringing about a certain outcome,[34] so that a prospective user can be advised as follows:

"If you use (these products) with (personnel) who have been trained to perform (in these ways and under these environmental conditions), you will achieve (these results) with (these learners)."[35]

Fourth, in order to achieve this objective, development work proceeds in a systematic and sequential manner, moving in a smooth progression from prototype design (that is in the most rigorous versions of R&D often the end product of an applied research effort), to product or program development in accordance with detailed specifications, to evaluation of small field tests, to revisions, to larger field tests, to more revisions, to an additional field test, etc. until the product performs in accord with the prespecified performanee objectives. The process is cyclical. Products go through successive generations of revisions, each version a "rough approximation to be followed by a series of progressively closer approximations," "successive approximations" to the performance specificaions until the specified levels of success are achieved or "until the full possibilities of a given approach are realized."[36] As described by one developer active over the past decade:

"Development is a process occurring in a finite time period to reduce uncertainty regarding efforts required to achieve prespecified outcomes. Development proceeds over time by allocating and reallocating effort among different uncertainty-reducing possibilities, as activities are completed and knowledge accumulates."[37]

Fifth, as implied in much of the discussion above, decision-making in the systematic R&D mode is data-based, with empirical field testing and rigorous data analysis playing critical roles. Researchers are considered key members of the development team. Some use the term "applied research" for what the researchers do. Others prefer the term "formative evaluation." Regardless of what term is used, systematic R&D is distinguished from less rigorous developmental activity by their presence in the developmental activity by their presence in the development team and by the fact that their presence insures that attention is given to the R <u>and</u> the D in the R&D equation (and, with proper management, to the linkages between the two). The successive revisions of the development output are based on empirical field test data that are gathered systematically and analyzed rigorously. The evaluation data thus gathered are used not only as the basis of R&D decision-making but are also expected to provide the potential user with information about the outcomes or effects to be expected from use of the product under specified implementation conditions.[38]

The development process in the systematic R&D mode, then, is one of systematically followed sequential steps, recycling of development, evaluation, and revision through successive approximations, using empirical data to test product effectiveness, and moving progressively toward an output that can perform at prespecified levels of effectiveness which can be indicated in advance to inform the decision-making of potential adopters and users.

As a consequence of this process, systematic R&D as carried out in specialized development organizations tends to have a number of other distinctive features that set it off from less rigorous developmental activity. Continuing our listing, then:

Sixth, development projects implemented in accord with this model tend to require large personnel pools and heterogeneous skill mixes -- developers of various kinds, production staff, field researchers, data handlers, data analysts, liaison workers to smooth relationships with field sites, coordinators, supervisors, and managers of various levels in an often complex organizational pattern.

Seventh, these projects generally require extensive cooperation between the organization developing the product and the school systems agreeing to serve as field sites.

Eighth, as a consequence of all of the above, these projects tend to be large-scale and expensive.

Ninth, the products themselves are often complex, consisting of many and varied modules or components, and often several forms of media as well as printed materials.

Tenth, given the scale and complexity of thes projects and their adherence to a model focused on achieving prespecified objectives, the management of these projects is often highly formalized, using flow charts and sophisticated management tools, and attempting to adhere to tight schedules to permit effective coordination of the work of different interdependent subgroups.[39]

Finally, the R&D mode tends to include within it consideration of user system conditions. Educational R&D theorists are fond of pointing out that the ultimate objective of development work is not simply to produce products but rather to produce products that are <u>usable</u> within existing operational settings and that will <u>improve</u> education.[40] R&D outputs, then, must not only be supported by data that show them to be more efficient and more effective than existing alternatives. They must also meet needs perceived by users, in ways practitioners will accept, and must be relatively easy to use. This suggests that as an integral part of the processes of project selection, product design, development, testing, and packaging adequate consideration must be given to user needs, constraints, preferences, values, teaching styles, existing knowledge and skills, and problems of dissemination and implementation.[41]

Clearly, the R&D mode is considerably more complex than the practice-based/practice-related developmental activity described earlier. There is, of course, some variation in pattern depending, for instance, on the nature of the outputs being developed -- e.g., tangible products vs. harder-to-package change processes.[42] But the degree of complexity in contrast to the single teacher working alone, or the small LEA or university curriculum team, or even the textbook writer working with a publisher is illustrated by the kinds of issues of concern to R&D managers regardless of the form of the particular output -- e.g., How much research is needed prior to the development work? How much research can proceed parallel to permit initial field testing? At what point is the product sufficiently developed to permit initial field testing? At what point has the product been tested sufficiently to permit dissemination? What dissemination, marketing, and implementation factors need to be considered throughout the design and development phase? At what point does the responsibility of the developer end -- development? dissemination? installation? utilization and maintenance?[43]

D. Outputs

Elsewhere in this volume, we have discussed the outputs of educational R&D at great length.[44] For our purposes here, there is basically only one key point that needs to be underscored. With some notable exceptions (i.e., exemplary products of high quality that are being utilized extensively), the products and programs produced at great expense over the past decade or so, by educational R&D organizations using (to varying degrees) the R&D mode, have had relatively little impact on educational practice.

There is little in the way of hard evaluative data to indicate how many products, etc. fall into each category, or whether these are even appropriate category headings. But at the risk of being called to task for relying largely on impressionistic evidence, the picture appears to be roughly as follows:

Many R&D products (perhaps even most of this output) are generally viewed as mediocre in quality. Some (e.g., the much acclaimed Individually Prescribed Instruction units) may be high in quality but are far too expensive for school systems to use. Many (if not most others) have been unable to provide persuasive evidence that they are any more effective than existing alternatives produced by less rigorous and less costly conventional developmental activity. Many (perhaps most) are collecting dust on shelves rather than improving education in classrooms -- either because they meet no perceived needs of practitioners or because they were designed in a way that made them unacceptable to practitioners, or too difficult to implement under normal operational conditions, or simply too expensive for purchase and use by LEAs given their serious current budget constraints.

There is also a significant number of "exemplary products," each reporting use by thousands or even several million students.[45] It seems noteworthy, though, that 30 or so products are repeatedly pointed to in this exemplary category while a 1975 NIE survey tabulated data on as many as 776 OE/NIE sponsored products.[46]

E. Strengths/Advantages

Where systematic R&D is done well, this mode has several advantages over other kinds of developmental activity.

First, outputs are presumably better in quality since they rest on strong empirical foundations, have been extensively tested and refined, and are presented to potential users with evaluative evidence indicating what degree of success is likely to be achieved under what conditions.

Second, the outputs are presumably better because of the high quality resources used in the process. Professional developers with strong expertise in their fields devote 100% of their professional time to their development roles and receive considerable support from other members of their teams who might have other specialites called for in a given project. The outputs are presumably better, too, because development specialists functioning in specialized development organizations are more likely to keep up to date with development state-of-the-art, and reflect this in their work.

Third, the products are presumably better because they have been designed with nationwide dissemination and implementation considerations in mind and therefore packaged with sufficiently elaborated implementation supports to permit practitioners across the country to use them effectively.

And finally, since they were produced for nationwide dissemination presumably such outputs would find their way into central repositories or nationwide dissemination or marketing pipelines.

F. Weaknesses/Disadvantages

Given the poor quality of most of what has been produced by educational R&D, this mode of development work must also have some serious weaknesses or disadvantages relative to other forms of developmental activity. In considering these weaknesses we must distinguish between those weaknesses that are generic to the R&D mode, regardless of the field in which it is applied, and those that are contextual, i.e., peculiar to the education sector.

a. Generic Weaknesses

There are at least three significant weaknesses generic to the R&D mode, regardless of the field in which it is applied.

First, it suffers from its isolation from the user system. Since the work goes on in specialized development organizations external to the operating system, and is carried out by development specialists who are not users and spend little if any time either with users or working in the user setting, there are substantial risks that the work produced will not reflect user needs, tastes, or requirements. The consequences may be that these externally developed R&D outputs will not be adopted or used, or that they will require substantial adaptation to make them usable in the operational setting. A further difficulty resulting from the location of R&D outside the user system is the consequent need for dissemination or marketing, and the problems and costs this may entail. In addition, these problems may be further intensified by the likelihood that potential users may react to any externally developed products in terms of the all-too-familiar "not invented here" syndrome.

Second, given the organizational complexity of most projects carried out in the R&D mode, communication problems tend to be considerable and there is often serious attenuation in the excitement generated by a particular conception or prototype from the time it leaves the hands of its originator to the time it goes through the various phases of the R&D cycle and is ready for distribution to users. Evidence suggests that these problems are reduced considerably if the originator of an idea continues working with the project from its beginning to its very end.[47] However, the organiizational climate of tightly managed R&D projects is often incongruent with the styles and tastes of some creative talents, and there may be substantial difficulties in trying to attract concept originators to such projects, or to keep them there for any length of time.

And third, systematic R&D is generally very costly. According to one source citing experience from industry, it takes anywhere from five times to eleven times as much money to develop an application from a research finding as it costs to conduct the research that produced the finding.[48] Of course, if the development output is a superior product that is eventually widely used, the costs are amortized over the large numbers of units produced and the per unit costs may not be prohibitively high.[49] But that assumes the production of an output that is widely used -- something achieved in relatively few cases by educational R&D to date.

6. Contextual Weaknesses

Many of the weaknesses of the systematic R&D mode are traceable to weaknesses peculiar to the education sector -- weaknesses in both the operating system and the R&D system. The weaknesses are of several types. We consider at some length throughout this volume the manner in which educational R/D&I suffers from the immaturity of its personnel and institutional base: there are some strong development organizations, but only relatively few, especially in comparison to such other fields as health; and there are personnel doing development work, ~~but~~ relatively few trained in the development process. Conceivably, over time, with a sufficient infusion of funds (and wisdom) into the enterprise, and sufficient learning time, these weaknesses in the personnel and institutional base of the R&D system may be less readily identifiable as weaknesses of this mode of development in the education sector.

More critical, because so much more intractable, are weaknesses traceable to the immaturity of the knowledge and technology bases of education as a field of knowledge, education as a practice field, and educational development as an R/D&I specialty. The seriousness of these difficulties, and their implications for the R&D process, can probably be grasped most readily if we consider first the maturity of education as a field of knowledge.

The R&D model from industry assumes that complex problems can be broken down into "a large number of relatively well defined, small, but critical problems."[50] This requires substantial understanding of the parameters of the problem to the solved, the phenomena to be manipulated, the observations to be made, the measurements to be taken, the decision rules to apply in interpreting findings, etc. And it assumes the existence of strong measurement instruments and methodologies for carrying on the process. How much research is needed as part of the development process, how long it takes, and at what costs are related to how much dependable knowledge already exists as a basis for the development process and how effective the available technological tools are for making the required measurements and manipulations.[51]

Where there is a well developed, mature knowledge and technology base that is relevant to the problem at hand, the developer's role is largely one of translation:

The developer translates the variables of the practical problem into the variables of the relevant body of science, makes the necessary measurements, determines what predictions and changes of state are implied by the goals of the practical problem, and identifies or adapts the formulae required by the solution. Those unknowns that exist in the problem can be readily transformed into known variables.[52]

In this situation, relatively little research must be undertaken as part of the development process.

However, where (as in the case of education) there is little relevant dependable knowledge to work with and little valid instrumentation to employ, the situation is one where the unknowns in a problem are far more numerous than the knowns and it is difficult to make dependable predictions or manipulations. Consequently, a considerable amount of research and analysis must proceed along with the development work as an integral part of the process.[53]

In addition, there are other factors that make it far more difficult to translate performance specifications into effective products in the education sector, and suggest the need for extensive inquiry on product implementation as part of the development, packaging, and installation process. As compared to most other fields, outcomes of product use in education tend to be less predictable. In part, this is attributable to the limited technical capability of many practitioners to implement complex innovations without substantial implementation support and/or assistance. In part, though, the difficulty is due to the nature of the interaction between the user (e.g., the teacher) and the product. Teaching is a craftlike practice field rather than a technology.[54] Instructional approaches and their delivery are highly personalized. Two teachers using the same instructional program or set of materials are likely to present them somewhat differently, incorporating their understanding or what is to be taught and how into their own personal teaching styles. The consequence is to increase the unknowns in the R&D process, requiring additional inquiry on implementation as part of the development and packaging process.

Whereas the engineering model of R&D assumes definable component problems and prespecified outcomes for each, the outcomes of inquiry cannot be predicted in advance. Research may lead in different unknown directions -- some blind alleys, some wholly new unanticipated avenues may be opened up, branching off in various directions, etc. Consequently, detailed planning and tight scheduling -- the hallmarks of sophisticated management techniques -- become impossible to adhere to. The failure of attempts to borrow such sophisticated management technologies as PERT from industry and apply them to educational R&D underscore the difficulty. Sophisticated planning tools make little sense when applied to contexts where we have relatviely crude understanding of the phenomena to be manipulated or the developmental activities to be planned.[55]

Other difficulties are traceable to the weaknesses of the knowledge and technology bases of education as a practice field and development as an R/D&I specialty. As an immature craft, education has a relatively underdeveloped body of craft knowledge to pass on from practitioner to practitioner and inadequate organizational arrangements to support the creation of such craft knowledge and its transmission.[56] From the craft perspective, the critical point of intervention, for the improvement of educational practice is not producing more scientific research about educational processes or better materials or products for educators to use, but rather the improvement of the field's <u>experiential</u> knowledge base and a sharpening of practitioners' skills and the types of judgments required by practice. The implication of the craft perspective is that the R&D emphasis on developing programs or products for practitioners' use before developing the capacity of the practice system to effectively use these products is putting the cart before the horse, and inevitably dooming most R&D products to failure in the operational setting:

"...because craft knowledge and the varied organizations which support it are in a state of such weak development. the fields of practice in education are only marginally able to scrutinize, criticize, modify and use new knowledge arising from social science or technology. Thus practitioners mostly have neither the time, the training, the professional resources nor the organizational supports for such scrutiny or absorption."[57]

The R&D perspective in education has been modified somewhat over the years, increasingly taking into account the key importance of the practice setting. The notion that "teacher-proof" materials could be developed by educational R&D has gone into general disrepute. There has been substantial recognition of the importance of teachers' technical competencies in planning for product installation. And, increasing awareness of the critical effect of the interaction between the product and the user (defined here as the practitioner) has led to a shift in emphasis from the notion of product adoption (as produced and packaged by the developer) to product adaptation in specific operational settings.

Even so, if one accepts the craft perspective, all other things being equal, relatively little impact can be expected in the form of improved student performance as a result of the use of R&D products by school systems, unless substantial resources are focused first on the strengthening of educational practice. The state of the art of educational practice stands between the product and the student as "end-user": the R&D program or product must be delivered by the practitioner, whose ability to do so is limited inevitably by the immaturity of the craft. The provision of training programs specific to each R&D product to be implemented becomes a patchwork affair, effecting limited payoff. A particular product may have slightly more chance of success in achieving its intended effect, but it is likely to have little effect on increasing the likelihood of success for the next product to be implemented. More substantial payoff, over the long run, could be expected, according to this argument, by direct support to the strengthening of practice, so that some time in the future new approaches (from R&D or other sources) could be absorbed effectively and efficiently.

Regardless of where one stands in this debate, the immaturity of educational practice has undeniable significance. Given the immaturity of the practitioners' craft, practitioners not only find it difficult to incorporate externally developed innovations into their practice. They also find it difficult to specify what they need; developers have a hard time developing a clear sense of the requirements of the practice setting, and the critical "fine tuning" that is the essence of the R&D process, making the product fit closer and closer to the user's needs, is made all the more difficult.

The problem is complicated further by the immature state of the art of R&D technology in the education sector. There are two problems here. One is simply that the technology is not yet mature, i.e., the development state of the art in education appears to be relatively low compared to more mature fields. A second problem is that few educational developers appear to be sufficiently versed in, or able to keep up with, the development state of the art. Whether or not it is even possible to develop a specific product is determined by what the state of the art permits. Whether or not a product <u>should</u> be developed also depends on the state of the art, for there is no point in developing a product that is in fact obsolete if the state of the art permits a superior product to be developed. In education, developers as well as practitioners often seem to be "reinventing the wheel" or developing inferior products that seem obsolete before they are even ready for distribution. The reason simply is that educational developers do not seem to be as professional as they might be. Most developers seem not to know what other developers are doing or can do. Even if one were inclined to keep up with the development state of the art, this would be difficult to do in educational R&D. There is little codification of development knowledge or technology, the kind of codification to which developers could turn and on which they could rely. There is an absence of "handbooks." Lacking, too, are distinct, discrete, development-relevant categories that might facilitate information searches.[58]

As a result of all these factors, R&D in the education sector is a rather different phenomenon from R&D in mature fields with strong knowledge/technology bases. In mature fields, users can clearly specify what they need; developers and producers know exactly what the user means; the developer is then capable of producing the product and saying with assurance to the user, "Here is what you asked for;" and it is then obvious to users what to do with it. As an example, an airplane manufacturer may well be able to specify so clearly the requirements for a needed airplane part that the part can be developed to specifications and then, in effect simply be "plugged in." In education, however, the typical situation is one in which the user cannot clearly tell the developer what is needed, and the developer is not certain how to interpret what the user says he needs; even if the user could provide clear specifications, the developer probably would not know how to develop the product or program, and once developed, the user might not be certain what to do with it.[59]

In mature fields, the transformations from stage to stage of the development cycle tend to be largely translation processes, translating one set of unknowns into another, performing a few manipulations to translate unknowns into additional knowns to solve a problem. In education, however, where the unknowns are so numerous (and the knowns so few), the process is far more complicated. The transformations from stage to stage of the development cycle require more than simple translation. Considerable amounts of inquiry are likely to be required before one can move, for instance, from conception to prototype, from prototype to full scale development, from unearthing of implementation problems in field test sites to devising/appropriate revisions, from initial package to packaging in a form that can be readily disseminated and implemented easily and effectively.

As a consequence of these difficulties, development work in education requires a far greater investment of time and money in the research and evaluation components of the R&D process than would be the case in fields with strong knowledge/technology bases. R&D costs in education, then, are high relative to practical payoffs.[60] And, regardless of cost, the impact on "end-users" (i.e., students) is inevitably severly limited by the immaturity of the craft knowledge that supports educational practice.

Given all of the above, it may simply be that the substantial federal investment in educational R&D over the past decade or so may have been premature. The knowledge and technology base of education as a field of knowledge, education as a practice field, and development as an R/D&I specialty, and the personnel and institutional bases of educational R&D, may simply not have been sufficiently mature to enable the funds to be put to efficient use on the scale with which they were allocated.

We will explore some possible policy implications of this conclusion later in this chapter. For the present, let us turn to the mixed mode, which has come to increasing prominence in recent years as the strengths and especially the weaknesses of each of the previously considered modes have become all too apparent.

3. Mixed Modes

The fortune of systematic R&D in the education sector appear now to be on the decline. The reaction that has set in reflects the view that the systematic R&D mode has been insufficiently responsive to operating system needs and requrements, has failed to produce a sufficient number of high quality outputs, and has been far too costly relative to the slim payoff.

The cycle has turned full circle. Initially, the case was made that specialized R&D organizations external to the operating system were needed because few schools were innovative and operating system conditions tended to be inimical to innovation. Now, on behalf of various mixed modes of educational development, increasing recognition is being given to local, practice-based innovation as alive and well in many school districts across the country. The potential of the various mixed modes would seem to be that they attempt to build on the strengths of both practice-based development and systematic R&D while overcoming some of the weaknesses of each.

A. Settings and Personnel

The work done in mixed development modes generally spans a range of settings. Although there is some variability in the later stages of the process, what all variants seem to have in common is the initiation of the developmental activity in practice-based settings. A key element in this approach is practitioner development of conceptions into programs or projects which come (by one means or other)to be identified as "exemplary" and worthy of diffusion to other practitioners. What tends to distinguish this approach from the practice-based mode we considered earlier is the continuation of R/D&I processes past the point of the developmental activity that led to the establishment and demonstration of the exemplary program at its site of origin. Generally, this mode includes various validating, packaging. and/or dissemination mechanisms located in various other settings external to the originating school district.

The validation stage is intended to provide a quality control mechanism for the practice-based, mixed mode development work, The validation work generally involves: (a) gathering information about the effectiveness of the exemplary project (from evaluation findings produced by LEA personnel and/or third-party evaluation contractors); and (b) assessing the worthiness of a given program for dissemination as judged by the significance of the program and the soundness fo the evidence in support of its effectiveness.

The validation work can be carried out in any of several settings: (a) SEAs have become increasingly active in the identification, validation, and dissemination of exemplary programs developed by LEAs within their state boundaries. States with particularly strong programs have specialized staff assigned to the validation function. (b) In the '60s, OE established a Dissemination Review Panel to assess the claims made for exemplary programs developed with OE funds and identified as worthy of further federal funding to support their dissemination. Since the creation of NIE, this has become the Joint Dissemination Review Panel (JDRP), which reviews program evidence and approves programs for dissemination. (c) Following the Consumers' Union type of model, some independent private sector organizations review evidence on programs and products of various kinds and submit reports assessing the relative merits of each. The Educational Products Information Exchange is a good example of this pattern.

The personnel who carry out this validation work may or may not have full-time responsibilities for validation functions. Certainly in the case of the JDRP, this work takes only a small percentage of the time of the participating members. However, whether carrying out validation-responsibilities as a full-time or part-time responsibility, our impression is that the personnel assigned to this work generally have some specialized expertise in assessment of evaluation research findings or have access to staff with this kind of specialized expertise.

The dissemination activities connected with this mode may be carried out by any of a large number of public or private sector organizations -- through state dissemination networks; through the ERIC system and its hookups across the country with education information centers, education information agents, facilitators, and other kinds of change agents; through such OE-funded mechanisms as the National Diffusion Network; etc. The personnel involved tend to be a new breed of dissemination specialists. In some cases, notable the National Diffusion Network, the initial program developer may be actively brought into the process of disseminating a given program and assisting in its implementation at a new site.[63]

Our impression is that relatively little packaging of exemplary projects actually takes place, and that for the most part this mode relies on the demonstration strategy and interpersonal communication to convey the prototype program to potential adopters. Conceivable, where packaging is included in this mode, it could be carried out by the specialized development organizations that now perform systematic R&D. We will have more to say about this later.

B. Funding Sources

Most (if not all) work carried out in the mixed mode appears to be supported by state and/or federal funding. Although the initial developmental work on an exemplary program may have been carried out with no specialized funding, or under the auspices of one or another state or federal categorical funding program, the identification of programs as exemplary and their validation, packaging, and/or dissemination are generally supported with specialized dissemination allocations.

Some few states had strong programs of this kind before the federal government took an active interest in furthering this mode of R/D&I. Others developed these programs over the last 7-8 years with federal (OE and then NIE) seed money provided to support dissemination capacity-building.[62] Even where private sector organizations (such as EPIE) are involved, their activities are generally supported by federal grants or contracts.

C. Mixed Mode R/D&I Processes

What makes the mixed mode distinctive are not the R/D&I processes used but rather the settings where the various stages of the overall sequence take place. The initial developmental activity differs little from the practice-based development mode we considered earlier. It is carried out by practitioners working within the operational setting. Generally, it is undertaken to meet a particular need of the particular school system where the work is carried out. The program is rarely viewed by its developers (at least during the initial developmental phase) as a prototype to be developed further for national use or as an exemplary program to be disseminated and used elsewhere. However, what occurs after the initial developmental stage distinguishes outputs produced in this mode from those generated by the practice-based mode. Some agency or organization external to the originating site identifies the program as "exemplary" and then gathers and submits information about this project to some other agency or organizational unit for validation of the program's claims of effectiveness. If the program passes this stage, it may or (more likely) may not be sent on to some other organizaiton or organizational unit for packaging of one kind or another. Whether "packaged" or not, information and materials on the program are, then turned over to one or more other organizations or units for purposes of disseminating the program on either a statewide or nationwide basis.

Consequently, this mode is characterized by the large number of organizations and personnel involved in carrying out the various phases of the overall R/D&I process, and therefore substantial mangerial complexities in carrying out this mode well.

The mixed mode falls somewhere between the practice-based and systematic R&D modes in: (a) the amount of evaluation data provided; (b) the extent of "development" of the product; and (c) the costs incurred. Generally, though, on all three dimensions (but certainly the first two) the mixed mode is closer to practice-based development. In effect, as presently carried out, it is only a moderate extension of the practice-based mode, undertaken primarily as a dissemination rather than a development activity.

D. Outputs

The exemplary programs identified with the mixed mode have received mixed reviews, depending on who is making the judgments and what criteria they are using. The precise meaning of "exemplary" has defied rigorous definition or elaboration of standard criteria. Still, at least in comparison to most educational programs, we can tentatively describe them as relatively strong: all outputs identified with this mode have been screened, judged by some body as "exemplary", and validated by some quality control unit prior to their dissemination for broader use.

E. Strengths/Advantages

The mixed mode has all the strengths of practice-based development: the costs are relatively low, and the outputs produced reflect user needs and operating system requirements.

The mixed mode also has additional advantages that overcome some of the most serious weaknesses of practice-based developmental activity. It does produce some evaluation information to permit the outputs to be assessed, and it provides relatively good quality control mechanisms such as the JDRP or SEA validation units. Since the validated projects are generally input into some statewide or federal dissemination network (e.g.: the National Diffusion Network), there is some degree of documentation of the available outputs and there is an effort to disseminate these outputs more broadly.

And finally, compared to systematic R&D or to distributing funds to LEAs to permit them to build development capacity, this mode may provide the most substantial payoff per dollar of public funds invested: the risks are relatively minimal since the bulk of the funds are invested in programs already in operation and identified as "exemplary", with perhaps relatively small sums invested in mechanisms to seek out and identify them.

F. Weaknesses/Disadvantages

Still, compared to the best of the outputs produced by systematic R&D, this mode also has one significant weakness. Relatively few of the mixedmode programs are adquately packaged for dissemination and use elsewhere, increasing implementation difficulties and the possibility that initial successes will not be replicated elsewhere. We shall return to this point below.

III. POLICY OPTIONS

Despite the misgivings that have been voiced about the quality of educational development work to date, the substantial investment that has already been made in educational R/D&I over the past two decades suggests that investment in the development function will continue. But which modes of developmental activity shall be supported, to what extent? And what kinds of policies are most likely to strengthen the development function in the education sector and produce the greatest payoff in the form of improved functioning of educational institutions and improved performance of students?

Preferences for one or another of the three modes of development work are likely to reflect one's assumptions about which factors are most important in explaining the poor performance to date of the operating system, on the one hand, and the educational development function, on the other.

If one subscribes to the view that the most serious barrier to educational improvement has been the inadequacy of available materials and programs, and if one believes that the weaknesses of systematic R&D in the education sector are largely a reflection of immaturity (and are therefore neither inherent nor insuperable barriers), then one is likely to argue for substantial investment in systematic R&D carried out in specialized development organizations.

One is likely, on the other hand, to call for funding capacity-building in the practice setting (and with it probably some practice-based development work) if one holds to a different set of beliefs: that the key barrier to educational improvement has been the inadequacy of the experiential knowledge base of educational practice and the lack of organizational supports for developmetn of educational practice as a craft; and that educational R&D has failed in part because development work carried on outside the operating system cannot bring about substantial improvement until the craft of educational practice is mature enough to absorb externally developed technology.

If, however, one sees in the education sector a substantial amount of local innovation and exemplary practice, and identifies key barriers to educational improvement as inadequate dissemination of existing exemplary practice, then one's preferences are likely to be toward the mixed mode strategy (especially if one is unhappy with the investment that has been made in systematic R&D).

If recent experience is any indication of what is likly for the near future, all three modes are likely to continue to have influential proponents in educational policy circles and all three are likely to receive continued support (albeit with shifts in the proportion of the available funding pie allocated to each). We see little to be gained in trying to with one approach against the others, in search of the "one best" option. Policy choices are likely to reflect value positions and belief systems about causes and effects, at least as much as they are likely to reflect whatever imperfect empirical evidence one might try to muster on behalf of one mode or the other -- especially since all three must be viewed at this time more as emergent possibilities than as mature patterns of functioning to be assessed in terms of evidence on past performance. Choices will reflect the current swing of the pendulum favoring one or another of these options as the preferred mode of bringing about educational improvement, and the pendulum is likely to swing back and forth, reflecting the continuing "dialectic" in education.[64] Besides, it seems to us that each of these approaches simply emphsizes a different point in a seamless web of interrelated difficulties in the eduction sector.

Although certain kinds of strategic considerations might suggest the advisability of intervening first at one point rather than another (e.g.: the argument that external R&D cannot be absorbed by the user system until educational practice matures as a craft), as long as an effort is made to take into account the whole interrelated web of difficulties progress at any of these leverage points would seem to be possible and admirable. Therefore, they key question would seem to be not which of these modes should be strengthened, but rather how we may strengthen each, and what more we need to know before we can devise policies that are likely to be effective in achieving this end. The remainder of this chapter focuses on these matters.

1. Strengthening Systematic R&D

Given the weaknesses of systematic R&D in the education sector, there would seem to be several kinds of things that we need to do to strengthen this mode of development work.

First, to overcome the isolation of this mode from the user system (and its needs and requirements), mechanisms must be developed to more effectively link specialized development organizations to user systems -- e.g.: (a) recruitment of more practitioners for positions in development organizations (whether as temporary or permanent staff or as consultants); (b) temporary assignments of developers to operating systems to enable them to observe classrooms and schools in operation, to talk with practitioners, and to learn about their needs, requirements, preferences, constraints, etc.; and (c) ongoing need identification linkages with user systems throughout the R/D&I process to provide practitioner input into not only the initial need identification/project selection decisions but also into the successive fine-tuning of products throughout the cyclical development work and into the definition of needed packaging and implementation supports to permit effective use of the product in a range of operating systems.

Second, given the serious weaknesses of the institutional and personnel base of systematic R&D in education, it would seem essential to: (a) develop some clear information on the existing organizational capabilities (and personnel competencies) required to carry out systematic R&D, where these capabilities and competencies can currently be found (and to what degree), and what strategies might be most useful for building R&D capabilities in those existing strong bases; (b) screen and select carefully the organizations provided funded to carry on work in the systematic R&D mode, even if that means seeking out contractors and using sole source procurements or limited competitions as an alternative to open competition in the RFP pattern;

(c) organizing consortia of contractors if necessary for carrying out specific contracts if the different capabilities needed for various parts of a given project are best developed in several different organizations rather than all being developed adequately within a single organization; and (d) designing R&D procurement policies to achieve the dual objectives of R&D capacity-building as well as product development.[65]

Thid, given the weaknesses of the knowledge and technology base of education as a field of knowledge, education as a practice field, and development as an R/D&I specialty, it would seem essential to develop project selection and review mechanisms which take into account: (a) what areas of knowledge are best and least developed, sufficient to support R&D work with a minimum of applied research and a maximum of translating unknowns into knowns; (b) what types of development work the state-of-the-art of educational R&D and the available instrumentation make feasible; and (c) what practitioner behaviours and organizational arrangmenets are most or least likely to be effectively implemented given the state of the knowledge and technology base of educational practice. Further, given the critical constrining influence of the state of maturing of these knowledge and technology bases, it would seem essential to strengthen all three, and especially to fund the self-conscious development of the methodology of the R&D mode (systematizing the state-of-the-art into handbooks, professionalizing the developer role through the creation of specialized journals, professional associations or subgroups within associations such as AERA, etc.).

Fourth, to minimize the difficulties of getting externally developed outputs disseminated to, and implemented effectively in, operating systems, development policy needs to be made with dissemination and implementation constraints in mind and a systematic orientation to linkage and use problems.

Finally, given the relatively high costs of systematic R&D following the rigorous engineering model, and given the inevitable adaptation rather than adoption of R&D outputs in opeating systems, it would probably be useful to evolve other forms of R&D that may perhaps be closer to the practice-based or mixed modes of development rather that the rigorous engineering model. What we have in mind is a kind of "good enough" development -- i.e., R&D to a point where a product might become as attractive as an exemplary program developed by practitioners, but need not necessarily be developed to the point of meeting developers' prespecified performance outcomes prior to being turned over to operating systems for use.

While any or all of these strategies might hold out some promise of strengthening the systematic R&D mode over time, there would seem to be several kinds of information we would need to have before we would devise policies likely to be effective in achieving this end. Considering how little empirical work or even policy analysis has been directed at the development function as it exists in the education sector today, it would seem essential to carry out several kinds of data-gathering and analytical efforts first as a basis for planning and program development. Illustrative of the kinds of questions we wee in need of answers as a basis for policy formation are the following:

<u>Identification of Organizational Capabilities and Personnel Competencies Required for Systematic R&D</u>

What personnel competencies are required by the tasks involved in systematic R&D in the education sector?. What organizational capabilities are required to effectively muster and manage needed resources to conduct educational R&D is carried out?

Which of these competencies and capabilities seem most significant in distinguishing the organizations that were judged to be strongest in performing educational R&D and producing the highest quality, most widely used outputs?

Assessment of Existing Capabilities and Competencies, Location and Distribution Across Organizations

Among all the organizations currently carrying out systematic R&D for the education sector, how are these capabilities distributed? In terms of rough ratings, how well developed are each of these capabilities in each of these organizations? How many organizations already show high levels of work in each area of capabilities? How many organizations show moderate levels of development in each area of capabilities, and show promise that higher levels of work may be possible over time?

Are strong capabilities in specific types of skills distributed equally well across the country? Or do they tend to be clustered in only certain geographic areas of the country?

How many organizations show high levels of skill across a wide range of development tasks and activities? How many show strong levels of skill in only certain types of tasks and activities? Given the existing patterns, how feasible might it be to arrange multi-institutional procurements in which several institutions carry out different aspects of a single project?

Surveys of Existing Resources for Expanding and Strengthening Existing Capabilities/Competencies

How many "centers of excellence" in development work of various kinds exist currently?

How many new development specialists might be trained, over how long a time period, through current (and various hypothetical expanded) scales of operation of each of these centers? How many of these centers might be linked to other development organizations as a means of strengthening R&D work carried out in these other organizations? Through what linkage patterns? At what costs?

What other bases might be built up for strengthening systematic R&D? What universities might be sites for suitable training programs? What professional association activities?

Possibilities for Strengthening Need Identification Linkages

What possibilities currently exist between specialized development organizations and school systems?

How many school districts would be willing to participate in personnel exchanges with development organizations, consultative arrangements, and similar mechanisms for strengthening need identification linkages?

Information System on R&D Feasibility

What areas of knowledge are sufficiently developed to serve as a basis for systematic R&D using the engineering model: What kinds of R&D outputs might be developed applying the accumulated base in these areas of knowledge?

Which of the above are feasible given the state-of-the-art of development and R/D&I in education? Which are feasible given the existing instrumentation for measuring the effectiveness of outputs being developed?

Which of the above are most reasonable to fund given the areas of strength and weakness of existing educational practice?

2. Strengthening Practice-Based/Practice-Related Development

Since most of the products, programs, and practices developed in the education sector are the outputs of the practice-based/practice-related mode, initiatives to strengthen this type of development work might conceivably have the broadest impact. However, for must the same reason -- traceable to the enormous scale of this development system (potentially all schools, SEAs, publishers and other commercial suppliers, schools of education, etc.), this set of options might also be the costliest and most difficult to implement effectively on a broad scale.

Clearly, several kinds of things need to be done to strengthen this mode of development work.

First, it would seem essential to provide mechanisms to upgrade the development skills of the personnel producing educational programs, materials, etc. in LEAs, SEAs, schools of education, and private sector commercial firms. This might be accomplished through various means: for instance, (a) special in-service or summer workshop programs; or (b) linking internal development sites to technical assistance groups or R&D organizations who could work with practitioners or publishing house personnel on packaging conceptions or approaches in a way that would increase their usability elsewhere, while at the same time upgrading the skills of those internal personnel carrying out the development tasks.

In addition, it would seem important to establish mechanisms or strategies to link these internal personnel to up-to-date resources on the development state-of-the-art. This might take the form of a referral or consulting network, with internal developers able to get referrals to specialists in development work (or development modes) relevant to what they were doing, who could orient them toward other developers to whom they should talk, other development work they should examine, etc. Strategies of this kind directed toward upgrading the skills and sophistication of practice-based developers, bringing part-time developers up-to-date with state-of-the-art considerations, and linking them to high quality development resources, might produce significant gains in the quality of the development outputs produced in practice-based and practice-related settings.

Second, if the field at large is to be able to draw on the vast body of materials, programs, and practices produced in these settings, priority attention will need to be directed towards documentation of the outputs produced in these settings. Practice-based development work has been characterized as "invisible" innovation,[66] an illustration of the old philosophical dilemma. "If a tree falls in the forest and no one is around to see it, did the tree fall?" Is practice-based innovation alive and well but not visible because it has not been documented for the world to see? Or is little such innovation to be found, whether documents or not?

What seems to be called for, at the very least, is a catalgog-type listing of what has been (or is being) produced, where, and how a potential user might acquire sample outputs to examine or arrange for site visits to observe a program or strategy in operation and speak with practitioners who have used it. Even more desirable would be an ERIC-type operation that not only publishes abstracts of what is available but also (a) acquires, stores, retrieves, and distributes documents in response to specific requests, and (b) is linked to educational information centers and various active, interpersonal, assistance-providing mechanisms that work with practitioners to enable them more effectively to draw on and use what is available. This kind of output-accessing facility might be established within the ERIC system. (The product development reports completed by developers using NIE funds and incorporated within the ERIC library are one example of this kind of strategy.[67]) Or, it might be set up as a separate, computerized storage and retrieval system. Or it might be linked to planned programs such as NIE's R&D Exchange Program.[68] Or it might be linked to SEA information bases already operating for purposes of disseminating exemplary practices originating in their schools.[69]

Whatever form the accessing, storage, and retrieval system takes, its degree of success is likely to be dependent on the mechanisms developed to get school systems to report on the materials, programs, and strategies they develop, and contribute these outputs to the system. An annual survey might be conducted, perhaps incorporated within (or associated with) NIE's planned survey of school practice.[70] Participants might be stimulated fy financial incentives, e.g.: the creation of a royalty type of arrangement through which contributing school systems might receive payments for each item contributed to the system. The size of the payment for each item might be determined by the complexity, degree of development, and perhaps too, judgments of the quality of each item contributed. (The range might run from a single interesting lesson, on the one hand, to a full curriculum and instructional system with supportive materials, on the other.) The payment formula might be applied by a review panel of judges, who would thereby also provide the field with a body of people intimately familiar with the full range of practice-based development work going on across the country. Additional royalties might be provided to contributing school systems over time, based on the number of other school systems adopting (or adapting) and using these items for one year, three years, etc.

Obviously such a proposal contains within it a number of risks -- such as the oft-cited fear in the education sector of introducing "hucksterism." But in the long run, with sufficient safeguards, such a system might be less costly than investing heavily in systematic R&D by specialized development organizations. And too, it might produce a substantial body of documented, accessible materials, programs, and products already in use in school systems. And most attractive of all, it might well entice financially hard-pressed school districts not only to document the innovative programs and materials they have already developed but also to take advantage of this new source of needed funds, it might spur these districts to so arrange staff time that a great deal of new development work might be forthcoming.

A third kind of initiative would seem to be needed to provide evaluative information on the programs, practices, and products accessed and stored in the new system. One of the key problems hampering rational decisionmaking by school systems considering the adoption of new programs or practices is the fact that even where evaluative information is available from field tests of a given program or product, that program or product competes with an enormous body of unvalidated practices, programs, or products.[71] Consequently, the adopting school system has no way of assessing whether a program that provides evaluative information is or is not more effective than an alternative on which there is no evaluative data. The choice among such alternatives, then, is likely to be made on bases other than the evaluative information provided.

If mechanisms were available to assess all of the existing alternatives accessed in the kind of system we have been suggesting, adopting school systems would be in a much better position to judge alternatives in terms of data on effectiveness. Such validating mechanisms are likely to be costly. But they would seem to be essential, and well worth the cost. It may be possible to reduce costs by building on existing mechanisms that provide such information, e.g.: SEA units responsible for validating exemplary practices selected for statewide dissemination.

All three modes of development work suffer from weaknesses in the dissemination of outputs. But of all three modes, the problems are cearly the most severe in the practice-based type of development work. Systematic R&D is carried out by specialized R&D organizations who generally undertake to disseminate their outputs (however poorly) and often provide implementation assistance as part of their development enterprise. The mixed mode is specifically designed to overcome the dissemination weakness of the practice-based mode and mixed mode strategies are generally designed to include linkages to dissemination networks (however inadequate these may be). The problem is most severe in the practice-based mode because here, unless there is a specific linkage to mixed mode packaging and dissemination mechanisms, the work is generally undertaken with no thought of broader dissemination, no provision for personnel to carry out dissemination responsibilities, and little if any effort to turn over a locally developed output to some other institution or network for broader dissemination. Therefore, practice-based development remains "invisible" innovation.

To overcome this difficulty, a needed fourth kind of initiative for strengthening this kind of development work should focus on dissemination issues. Clearly, one option is simply to try to link all practice-based development (and wherever possible practice-related development work as well) to external dissemination mechanisms — i.e., to transform the practice-based/practice-related mode wherever possible into the mixed mode. Another, probably more costly and less efficient option, would be to fund dissemination activities by the LEAs themselves, or to link LEAs regionally through some mechanism such as NIE's R&D Exchange Program to stimulate LEAs to exchange ideas, programs, and materials.

Regardless of how the dissemination problem is overcome, the greatest weakness of the practice-based mode (and probably too the mixed mode as well) is likely to remain the lack of attention to packaging of locally developed outputs for use elsewhere. Several kinds of initiatives might be attempted. Those that seem most reasonable to us link developers in practice-based and practice-related settings to packaging specialists employed in other settings, such as specialized R&D organizations. In essence, then, what we are suggesting transforms the practice-based/practice-related development pattern into the mixed mode. For instance, LEAs who believe they have some locally developed programs or materials that should be input into a nationwide dissemination system might take the initiative to link themselves to any of an array of packaging resources publicized in an annual catalog of sorts. Such resources might include private or public sector R&D organizations, technical assistance organizations, publishing houses or media firms, consultants in university settings, etc. Each of the potential resources might be described briefly in a catalog in terms of types of specialties, track records of similar packaging projects completed in the past (along with past clients as references), fees or future-royalty-sharing arrangements possible, etc. As an alternative to LEA-initiated searches for such resources, a referral service could be set up to match LEA needs with available resources, a referral service could be set up to match LEA needs with available resources. As an even more proactive option, we might envision setting up specialized units to search out high quality, potentially packageable, locally developed outputs, and then assist the LEAs in using the referral service and collaborating with packaging specialists to increase the usability of their outputs (and thereby increase their royalty potential if they were input into the kind of system we suggested earlier). In SEAs that already have specialized units which identify exemplary practices in the schools of their state for validation, packaging, and dissemination, these units might be used for this purpose. In other states, similar units might be established.

We need not carry this discussion further. Clearly, there are several kinds of setps that might be undertaken to strengthen this mode of development work. Some of those we have envisioned are quite elaborate. Others are less complex. The possibilities are endless.

Some kinds of initiatives might be linked to other purposes, for instance, broadening the base of sponsorship for educational R/D&I activities. Clearly, if the profit potential seemed reasonably good, publishers, film makers, and other private sector commercial firms might be enticed into investing more heavily in development work, especially if they entered the development process after the high-risk early conception and design phase and were brought in primarily at the point of packaging for broader distribution and use programs and materials already identified as high in quality and potential scale of utilization.

Some initiatives might be linked to system capacity-building, e.g.: slowly building packaging capabilities within the educational R/D&I system while using as a stopgap "rented" packaging capacity from other fields.[72]

Other initiatives might be linked to reviving the "best minds" development model used in the early history of educational R/D&I, when eminent scientists and mathematicians participated in the NSF Course Content Improvement Program and produced exciting new high school curricula and materials.[73] That model was rejected in favor of new organizational forms such as the labs and centers. The argument for that course of action, in part, was that the materials produced by the "best minds" model were not developed with sufficient attention to instructional requirements and were not sufficiently tested in the manner of systematic R&D, to insure their usability and effectiveness with a wide spectrum of students. The NSF model was a practice-related form, a more elaborate version of the curriculum projects that had been carried out by one or more university professors for school system use. Clearly, instead of rejecting this model, federal policymakers could have opted to strengthen it by broadening the curriculum development teams to include practitioners and learning theorists and expanding the development process to include more elaborate field testing and revision cycles. Revival and strengthening of this approach would seem to be an option worth considering.

Before we would be in a position to design the kinds of initiatives we have been suggesting, we would need to know considerably more about the preferences, needs, and perceived interests of practitioners and others who might be involved in such programs. At the very least, we would need to know:

- what development skills practitioners who carry out this work perceive they need (and how this compares to a similar assessment by development specialists in specialized R&D organizations);

- what resources practitioners think they would (and would not use, and why, among all the hypothetical possibilities we might describe that could be made available to them;

- what kinds of arrangements school districts would find acceptable to enable their personnel to carry out more development work, and what financial incentives might be required before this could be made acceptable;

- what kinds of outputs they would want to see accessed and stored, in what forms;

- what kinds of accessing and retrieval mechanisms they would be most likely to use;

- what kinds of evaluative information they would want to have available as a basis for adoption/adaptation choices;

- what evaluative procedures they would find acceptable to permit validation of outputs they contribute to the system;

- what kinds of incentives would enable them to participate in the system we suggested for documenting their outputs and contributing them to a nationwide system for possible royalty payments; and

- what kinds of safeguards they would see as required to prevent "hucksterism" and other potential risks in such a system.

We would also need to know considerably more than we know now about the resources available for transforming the practice-based/practice-related mode into a pattern resembling more closely the mixed mode. That is, we would need to know:

- what dissemination mechanisms are already available (and what others might be readily developed) with the capacity to handle the enormous quantity of outputs likely to be forthcoming from documentation of practice-based/practice-related work;

- what quality control and validation mechanisms might be used as models for incorporation in such a system;

- what kinds of packaging resources are available, were, and at what likely costs; what kinds of packaging capacity are available for "rent"; what organizations with some degree of packaging capacity might be used as centers around which to build packaging capacity within the educational R/D&I system.

3. Strengthening the Mixed Mode of Development Work

Much of our discussion of initiatives that might be undertaken to strengthen practice-based/practice-realted development work suggested that what was needed was to transform that kind of development activity into the mixed mode. However, we also pointed out in that discussion that for the mixed mode to work we needed to strangthen mechanisms for identifying locally developed outputs worthy of broader dissemination and use, for validating these outputs, and especially for packaging them in ways that would permit them to be used effectively elsewhere. We noted too what kinds of information we need to gather about existing resources for carrying out these tasks, and what current bases exist for strengthening and expanding such capacities to the scale and quality required.

There is little we could add to that discussion at this point. Clearly, we see great promise in the mixed mode of development work. It may over time, if sufficiently strengthened, combine the advantages of both the systematic and practice-based modes while overcoming some of the most serious weaknesses of each -- in short, it may offer the promise of being "the best of both worlds." As yet, however, little of the needed capacity for this kind of work exists, much less the critical coordinating and linkage mechanisms that may be the key determinants of success or failure for such a complex multi-institutional approach. The possibilities, though, are attractive, and do seem to warrant further policy consideration.

IV. CONCLUSIONS

When R&D came to be institutionalized as a key strategy for improving educational practice, the rationale was that the development function was the missing link needed to transform research findings and exemplary practices into usable packages for wide scale dissemination. The lofty hopes for systematic R&D have not as yet been realized. But there does seem to be some promise for the future in the fact that some exemplary outputs have been developed through systematic R&D procedures, and there appears to be a vast storehouse of undocumented practice-based development outputs that probably could be developed to the point where they can be used on a wider scale. The rationale for the development function in education seems almost as persuasive now as it was fifteen years ago. But we are probably in a stronger position now to realize that potential, for we have learned a great deal over the past fifteen years about how the systematic R&D model needs to be adapted to the educational context, and how development work going on in practice-based and practice-related settings can be strengthened.

It will take decades to realize that potential, if it is to be realized at all. For the kinds of capacity-building and linkage-building strategies we have suggested here are extremely complex and will take a good deal of time to carry out. At this point, it would seem, consideraton needs to be given to the long-term prospects, the costs, and the requirements for successfully implementing such complex strategies. Project-by-project funding alone is not likely to take these broader, long-term considerations into account. A "development policy" would seem to be needed, based on considera-tion of the available options and tentative choices about the relative investments to be made in each, embodying a long-term commitment to development work (whether carried on in sites within or external to school systems) as a key strategy for the improvement of educational practice.

FOOTNOTES

1. For instance, see: Walter R. Borg, "Educational Research and Development and Educational Change," in John K. Hemphill and Fred S. Rosenau, eds., Educational Development: A New Discipline for Self-Renewal (Eugene, Oregon: Center for the Advanced Study of Educational Administration, 1973); Bette C. Porter, ed., The Oregon Studies in Research, Development, Diffusion and Evaluation, Vol. II: The Literature of Educational RDD&E (Monmouth, Oregon: Teaching Research, Oregon State System of Higher Education, 1972), p. 814; Egon G. Guba, "The Expanding Concept of Research," in Oregon Studies, Vol. II, op. cit.; Launov F. Carter, "From Research to Development to Use," in Oregon Studies, Vol. II, op. cit.; Robert H. Pinney, "Research and Development: The Reduction of Uncertainty," in Oregon Studies, Vol. II, op. cit.; and Frank A. Schmidtlein, "The Programs of the Fifteen Regional Educational Laboratories," Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970. Two studies from fields with stronger scientific knowledge bases were often cited to support this argument: C.W. Sherwin and R.S. Isenson, "Project Hindsight," Science, Vol. 156, 1967, pp. 1571-1577; and R.R. Mackie and P.R. Christensen, Translation and Application of Psychological Research, Technical Report 716-1, Personnel and Training Branch, Psychological Sciences Division, Office of Naval Research, January 1967

2. Hemphill and Rosenau, ed., Educational Development: A New Discipline for Self-Renewal, op. cit.

3. National Council on Educational Research, Resolution NCER CP 77-001, March 18, 1977, as cited in Ward S. Mason and Carnot E. Nelson, "Federal Funding of Educational R&D: R&D Function by Agency," Educational Research, Vol. 7, No. 6, June 1978.

4. For instance: John K. Hemphill's article, "Educational Development," was originally published in The Urban Review, Vol. 4, No. 2, October 1969, then reprinted in The Oregon Studies, Vol. II, op. cit. and in Hemphill and Rosenau, op. cit. Walter R. Borg's article, "The Balance Between Research and Development" was originally published in Educational Technology, Vol. 6, No. 7, 1969, then reprinted in The Oregon Studies, Vol. II, op. cit. and in Hemphill and Rosenau, op. cit. John K. Hemphill's article "Management and Operation of Educational Laboratories," was published origianlly in the Journal of Research and Development in Education, Vol. 3, No. 2, Winter 1970 and then reprinted in The Oregon Studies, Vol. II, op. cit. and in Hemphill and Rosenau, op. cit. Other pieces published initially in the Winter 1970 issue of the Journal of Research and Development in Education and then reprinted in The Oregon Studies, Vol. II include

James W. Becher's article, "Incorporating the Products of Educational Development into Practice" and Richard E. Schutz, "The Nature of Educational Development." Articles appearing in both Hemphill and Rosenau and The Oregon Studies, Vol. II are Paul D. Hood, "Dissemination, Distribution, and Utilization of Laboratory Products," and Walter R. Borg, "The Balance Between Research and Development." In addition, The Oregon Studies, Vol. II is made up entirely of reprinted articles selected for their importance, including several pieces by Hendrik Gideonse, Egon Guba, and others.

5. These studies were conducted by Burkhardt Holzner of the University of Pittsburgh Sociology department.

6. R.L. Baker and R.E. Schutz, eds. Instructional Product Development (New York: Van Nostrand Reinhold Co., 1971).

7. For instance, Borg, "The Balance Between Research and Development," op. cit.

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19. These included Project English and Project Social Studies, curriculum development projects funded by the Office of Education on several university campuses in the early 1960's.

20. Ralph Tyler estimates that textbook publishers spend approximately $90,000,000 each year on the development of materials. The estimate is derived as follows: approximately $900,000,000 a year is spent by LEA's on the purchase of instructional materials (1.5% of LEA operating budgets) and educational publishers on the average devote approximately 10% of their income to development work. Ralph W. Tyler, ed., Prospects for Research and Development in Education. (Berkeley: McCutchan, 1976), p. 39.

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23. Ronald Lippitt, "The Use of Social Research to Improve Practice," in The Oregon Studies, Vol. II, op. cit.

24. Cronbach and Suppes, op. cit.

25. Borg, "Educational Research and Development and Educational Changes," op. cit.; also see Schmidtlein, op. cit.

26. Borg, "Educational Research and Development and Educational Change," op. cit.; Hemphill, "Educational Development," op. cit.

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31. NIE, 1976 Databook, op. cit., p. 1

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33. Lynch, op. cit.; Mason and Boyan, op. cit.; Randall, "An Operational Application of the CIPP Model for Evaluation," op. cit.; OE, Educational Research and Development in the United States, op. cit. Chapter 1; Gideonse, "Research, Development and the Improvement of Education," op. cit.; Chase, "R&D in the Remodelling of Education," op. cit.; Pinney, op. cit.; and Borg, "Educational Research and Development and Educational Changes," op. cit.

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35. Schmidtlein, op. cit., p. 19.

36. Chase, "R&D in the Remodelling of Education," op. cit. For other discussions of cycling and the idea of successived approximations, see: Schmidtlein, op. cit.; Schutz, "The Nature of Educational Development," op. cit.; Becher, op. cit.; Hemphill, "Education Development,: op. cit.; Gideonse, "Elements of National Science Policy," op. cit.; Borg, "The Balance Between Research and Development," op. cit.; Borg, "Educational Research and Development and Educational Change," op. cit.; Jones, op. cit.; Randall, "The Development Process," op. cit.; and Randall, "An Operational Application of the CIPP Modell for Evaluation," op. cit.

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41. For instance, see: Hood, op. cit.; Becher, op. cit.

42. Hemphill, "Educational Development," op. cit.

43. Borg, "The Balance Between Research and Development," op. cit.; and Hood, op. cit.

44. See chapter entitles "Educational Research and R/D&I Outputs."

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71. Lippitt, "The Use of Social Research to Improve Practice," op. cit.

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EDUCATIONAL RESEARCH, DEVELOPMENT,

AND INNOVATION: THE INSTITUTIONALIZATION

OF CHANGE IN EDUCATION

CHAPTER TWELVE

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CHAPTER TWELVE

THE DISSEMINATION FUNCTION

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I. DEFINITION OF THE SCOPE OF THE DISSEMINATION FUNCTION

Although the term "dissemination" has been widely used in education for some time, there is clearly little consensus on the scope of activities subsumed under that label. The problem has been complicated somewhat by the changing nature of the dissemination function in educational R/D&I, with more and more active strategies gaining increasing acceptance as part of the dissemination function.

At least four terms have been used to describe this function in other R/D&I systems: "dissemination," "diffusion," "marketing," and "distribution." For simplicity, we shall use the term "dissemination" to cover all four meanings. Neither "marketing" nor "distribution" seem well suited usages for describing the reality in educational R/D&I. Despite several discussions in recent years about bringing a marketing approach to educational R/D&I,[1] and despite the current focus on user needs and viewpoints,[2] the marketing perspective appears to be almost totally absent from educational R/D&I policy making at present. And, with the exception of commerically developed products, there has been little in the field of education that could appropriately be described as a "distribution" system. In fact, lack of availability or access to R&D outputs that have been developed is repeatedly pointed to as one of the key problems to be addressed by the dissemination function in educational R/D&I.[3] Of the two remaining terms ("dissemination" and "diffusion"), "dissemination" seems to be more widely used, perhaps because "diffusion" generally suggests a less proactive process. At some point in the future development of the dissemination function in educational R/D&I, there may be well developed marketing and/or distribution systems for segments of the available inventory of educational R/D&I outputs. For the present, though, we must focus on dissemination alone.

*This chapter presents in summary form material that will be expanded extensively in the next draft of this volume, already in preparation.

There have been several recent attempts to define the dissemination function in a manner that takes into account both newer and older perspectives on the scope of activities falling within the dissemination function.[4] One of the most useful of these was developed by the Dissemination Analysis Group (DAG) established by the Office of the Assistant Secretary for Education, DHEW. The DAG defined dissemination as including four types of activities:

a) Spread: The one-way casting out of knowledge in all its forms: information, products, ideas and materials, "as though sowing seeds." Examples: ... journal and magazine articles, books, newsletters.

b) Exchange: The two-way or multi-way flow of information, products, ideas and materials as to needs, problems, and potential solutions. Examples: need arousing, need-sensing, and "feedforward" (user influence) activities; feedback activities as user surveys, user panels, and site visits; and sharing activities, such as conferences among peers.

c) Choice: The facilitation of rational consideration and selection among those ideas, materials, outcomes of research and development, effective educational practices and other knowledge that can be used for the improvement of education. Examples: Incentives for LEAs to engage in search behavior before making decisions; training in decision-making; visits by decision-making practitioners to a variety of demonstration sites; searches of resource bases, and comparisons of the array of relevant programs, products, or knowledge so generated; catalogs comparing alternatives; traveling exhibits.

d) Implementation: The facilitation of adoption, installation and the ongoing utilization of improvemements. Examples: Consultations, on-user-site technical assistance, locally tailored training programs in required new behaviors; laboratory settings for the practice of new behaviors.[5]

Our analysis in this chapter is concerned with activities that fall within the first three of these categories. We deal with implementation-related activities in a separate chapter on the implementation and utilization functions in educational R/D&I. And, it should be noted that there is some overlap between activities in the "choice" category and some of the material covered in our chapter on the acquisition function. Our analysis will focus on how the field's understanding of the nature of the dissemination function has been changing over the past two decades, encompassing a greater and greater range of activities and strategies, requiring increasingly more active postures in relating to the operational system. We shall consider, too, the evolving institutional, personnel, and knowledge bases of the field and what more may be needed to strengthen and expand the dissemination capacity of the educational R/D&I system.

II. THE TRANSFORMATION OF DISSEMINATION FROM A MISSING LINK TO A MAJOR FOCUS OF FEDERAL AND STATE POLICY INITIATIVES

Over the past decade, there has been an extensive amount of federal and state level attention to educational R/D&I dissemination issues. Dissemination concerns are not new to either federal or state education agencies. The Office of Education functioned through most of its history since 1867 largely as a dissemination agency. And dissemination has long been one of the major areas of activity performed by SEAs.

But what is particularly striking about federal and SEA dissemination policy making over the past decade has been the considerable concern with: (a) system-level (rather than simply program-level) dissemination issues; and (b) building dissemination capacity.

Consequently, an enormous policy-oriented literature on dissemination issues has been proliferating -- much of it produced by advisory panels an/or groups brought together to coordinate diverse federal and/or state dissemination programs[6] -- and a substantial institutional base for the dissemination function has been evolving, along with new approaches to disseminating information, research findings, products, programs, practices, instructional and organizational strategies.

Clearly, the dissemination function has come a long way in a short time. A pervasive theme of the educational R/D&I literature of the '60s was the enormous gap that existed between research and practice and the relative absence of institutionalized roles or arrangements to link educational research and R&D to educational practice. Research (and R&D) and practice were described as existing in two separate worlds, relatively isolated and insulated from one another. Research produced findings that had no discernible impact on practice. Development activities generated products and programs that were implemented in relatively few schools. And all the whole, difficult operational problems of practitioners were either ignored by researchers and R&D personnel, or were solved by practitioners themselves, without the help of the research/R&D community and without using their systematic, rigorous approeches to inquiry and design.[7]

Although there are a number of possible explanations for this state of affairs, a substantiel portion of the literature of the 1960s attributed the problem to the weaknesses of the dissemination function in education. Proponents of this view argued that highly useful information and programs were available and could be applied to solve operational problems and improve practice, if only practitioners could be: (a) made aware of their existence, (b) motivated to consider their use, and possibly (c) shown how to use them.

There is some disagreement in policy circles about the extent to which dissemination strategies can be expected to improve educational practice. An individual's commitment to the dissemination approach seems related to the extent to which he agrees with two fundamental assumptions: (a) that the outputs of educational research and R&D to date include a significant enough amount of usable information and first-rate programs, products, and strategies that effective dissemination and use of these outputs could substantially improve educational practice; and (b) that practitioners will accept and use, in some form or other, R&D outputs developed by others.

Still, regardless of where one stands on these issues, it became increasingly clear to education policy-makers in the late 1960's that the investment that had been made in educational R&D would not bear fruit unless better mechanisms were developed to insure effective dissemination of these outputs to potential users. Simple "building a better mousetrap" -- if indeed these educational R&D outputs were "better mousetraps" -- did not mean that the world would beat a path to their door. At least this had not been the case in education. The response was a number of significant federal initiatives to strengthen the dissemination function and establish needed linkages between the KP and KU ends of the KPU spectrum in education.

III. TRADITIONAL DISSEMINATION CHANNELS: INFORMATION FLOWS PRIOR TO THE EMERGENCE OF AN ACTIVE FEDERAL ROLE IN DISSEMINATION

Traditionally, the dissemination function in education had two distinguishing features. First, it emphasized the flow of information, mostly the outputs of research. There was relatively little that could bedescribed as marketing or distribution of packaged R&D products.

And second, dissemination strategies tended to be so passive and uncoordinated that the burden of effort in retrieval was on the researchers and practitioners seeking information.

The characteristic channels were publications -- reports of research findings in technical reports to sponsors, or in scholarly journal articles targeted at the research community, or in non-technical form in articles appearing in the magazines and newspapers read by practitioners and laymen. Informal, interpersonal information exchanges took place at professional association meetings of researchers and at other meetings of practitioners, and at occasional conferences, seminars, or workshops. The universities and teacher-training institutions also performed a key role in passing on a field's knowledge base in pre-service training programs, or in updating knowledge and skills thorugh in-service training. For the most part, however, this pattern involved dissemination of individual pieces of information products designed to produce changes in practice.

The exceptions here were the publishers and equipment manufacturers who packaged information or technological products into immediately usable forms and had well developed marketing and distribution operations to get their products into the hands of practitioners with a minimum of effort on the part of operative system personnel.

IV. FEDERAL DISSEMINATION INITIATIVES IN THE 1960s AND 1970s

Federal R/D&I policies in the '60s added several new dimensions to the then existing modes of dissemination.

1. The ERIC System

The ERIC system was clearly the single most sizeable undertaking in federal dissemination policy. The ERIC system was created by OE to acquire, store, abstract, reproduce and distribute, and provide easy computerized retrieval of sources from the enormous fugitive literature of the field of education. Its network of clearinghouses each specialized in selected topical areas (e.g., vocational and technical education, education of the disadvantaged, teacher education, early childhood education, exceptional children, educational administration, higher education, etc.). The ERIC system provides publications that announce acquisitions to the field and therefore are expected to make them more visible; indexes the journal literature of the field as well as the fugitive literature stored in the ERIC collection; and provides hundreds of information analysis products that synthesize information in selected topical areas.

The ERIC system is clearly a valuable resource. However, it has been criticized repeatedly on at least two grounds. One of these is quality control. Most of the clearinghouses appear to have tried for comprehensiveness rather than selectivity in their coverage of the literature produced in their topical areas. Consequently, the user of the system is often overwhelmed by the huge amount of literature the system retrieves in any area, and discouraged by the poor quality of much of what must be reviewed before he can separate out the few high quality documents he needs to meet his information requirements. The effect is often to discourage further use of the system. A second focus of criticism has been the system's bias towards the needs of researchers rather than practitioners. More recently, in response to practitioner needs, ERIC acquisition programs have included efforts focused on storage and retrieval of curriculum packages and other development products (e.g., product information packages). As yet, though, ERIC appears to be used relatively little by practitioners.

2. Other Federal Dissemination Initiatives in the 1960s

Dissemination was also a concern in some of the other federally funded programs begun in the 1960s. For instance the network of institutions created by the federal government in the '60s included organizations charged with responsibility for acquiring and disseminating instructional materials in given areas (e.g., the instructional Materials Centers) and organizations designed to demonstrate and disseminate exemplary local practices (the ESEA Title III demonstration centers). Dissemination of the R&D outputs of the laboratories anc centers was considered a major function of these organizations (at one point approximately 25% of the budgets of each of these organizatons was mandated for dissemination). And categorical programs (e.g., ESEA Title I, Upward Bound, programs for the handicapped, and vocational/career education) have always included dissemination components.

Clearly, then, a substantial amount of dissemination activity was funded by the federal government in the 1960s. Still, despite all this activity, it seemed clear by the early '70s that the outputs of educational research and R&D were not reaching the user system to any significant degree or having clearly visible impact on improving educational practice.

3. <u>The Development of More Active Federal Dissemination Strategies in the 1970s</u>

Current federal dissemination programs have been built on many of the initiatives of the '60s, but carry them further and change the focus of federal dissemination strategies. Historically, the overall federal strategy could be characterized as:

a) initially one of laissez-faire[8] (prior to the mid-'60s and in the initial conception of ERIC as a passive information repository);

b) then a strategy of product advocacy[9] (the Instructional Materials Centers, laboratories and centers, and Title III demonstration centers advocating the use of particular products or programs they selected or developed);

c) and finally, strategies of

coordination of existing discrete efforts,[10] and

change process advocacy,[11] replacing advocacy of particular programs and products with informational and capability building approaches: providing extensive amounts of (and easy access to) information on the full a[illegible] available products, programs, and practices t[illegible] given needs; providing easy access to education extension agents in local education information centers; developing users' capability for evaluating, adapting and implementing the products of their choice.[12]

The federal role is now often described as one of facilitating, coordinating, and providing start-up funds to mobilize state and dissemination resources. The focus is on building networks that bring together and strengthen the dissemination resources of existing organizations that carry out dissemination activities, especially the SEAs.[13]

Program-level dissemination programs of the traditional one-way information flow (or "spread") variety continue as a vital component of federal sponsorship of dissemination in education. In fact, the bulk of education dissemination funds obligated by federal agencies in FY 1975 fell into this category. The approximately $48,000,000 in FY 1975 obligations for education dissemination was distributed as follows:[14]

	$ (in millions)
Pub. Distribution of Social Scientific and Technical Information	2
Documentation, Reference, and Information Services	8
Research Synthesis for Use of Practitioners	5
Technical Assistance to Disseminate Knowledge	8
Conferences to Disseminate Knowledge	10
Creation of Dissemination Networks	11
Miscellaneous Dissemination Activities	4

Clearly, though, these data also suggest substantial funding of more active modes of dissemination than simply publishing and dissemination information or storing it for retrieval. Research synthesis represents one sizeable category (nearly 10% of the total); technical assistance to disseminate knowledge represents and even larger category (nearly 17% of the total); and the largest category of all is creation of dissemination networks (nearly 23% of the total). And it appears from other sources to be considered below that even the information service category includes more active forms of information service supplementing the traditional passive library reference modes.

When one focuses on the newer dissemination program initiatives of NIE and OE, it appears that the approaches receiving increasing funding are those that tend to be active and interpersonal, e.g. working through educational extension agents, local education information centers, networks of consultants, and interactive computerized retrieval mechanisms. Educational extension agents and other personnel working in local districts are linked to centralized resources and specialists, often in the state capitol; information needs of local users are determined; information and materials required to meet these needs are transformed into packages tailored to the user's needs and constraints; and followup supports and feedback mechanisms are built into the overall design.[15]

Initially, these approaches were developed in OE-funded pilot state dissemination programs in four states.[16] Under NIE's State Dissemination Capacity Building Grants Program, funding for the development of similar approaches was provided to 15 states in FY 1975. By FY 1978 as many as 40 states were expected to receive such grants,[17] and plans called for eventually extending this funding to all states.[18]

This active, interpersonal, user-oriented and field-based networking strategy appears clearly to be the direction in which much educational dissemination activity in the U.S. is moving at this time. Additional evidence of this is to be found in OE's support of the National Division Network (NDN) and NIE's planning work on its new R&D Exchange (RDx) Program. The NDN, for instance, links adopting school systems with developers of validated exemplary progarms, through the use of change agents who facilitate the adoption process.[19] The RDx is structured as a regionally-based exchange mechanism linked to national resources, on the one hand, and linking agents, on the other. The program is oriented toward a wide range of objectives which include:

making R&D outcomes more accessible to practitioners; making available information about the relative merits of alternative programs or products to meet a given need; providing direct services to linkage agents to help them acquire information, skills, etc. needed to help practitioners identify R&D outcomes which meet their needs; providing brokerage or referral services to help linkers identify and use dissemination resources more effectively; and helping linkage agents to facilitate the two-way flow of information between the R&D and practice communities, especially information about practitioner-defined needs and practitioner-developed exemplary practices.[20]

4. Federal and State Concerns With Coordinating Dissemination Activities

Over the last few years, there has been growing concern about the lack of coordination across the enormous numbers of dissemination programs in education. Policy-makers have directed attention at what they describe as fragmentation and duplication,[21] and several discussions of the subject point to the total of 208 legislative mandates or regulations dealing with dissemination in education.[22]

Since OE and NIE sponsor more than half of all federal-level education dissemination activities,[23] much of the recent attention to coordinating dissemination programs has come from the DHEW. A Joint Dissemination Review Panel was established to review claims of effectiveness for products developed under OE or NIE sponsorship and certify those products which the evidence suggested were worthy of wide scale dissemination. A Dissemination Policy Council was established to coordinate the dissemination activities of OE and NIE and to consider broad dissemination policies for the Education Division of DHEW as a whole. The Dissemination Policy Council created the Dissemination Analysis Group (DAG) to study federal dissemination activities and to develop recommendations for a comprehensive education dissemination policy.[24] NIE has supported the Interstate Project on Dissemination (IPOD) to identify state dissemination policy concerns, recommend needed dissemination policies at the state level, make recommendations to DHEW on what they see as needed federal dissemination policies, and develop recommendations on the appropriate relationships between federal end state dissemination programs.[25] And, in addition, NIE and OE sponsored a week-long conference of a group of more than 200 dissemination specialists representing a range of dissemination interests. The conference produced a "Statement of Agreement by Professionals in the Field of Educational Dissemination" calling for the development of a loosely organized Nationwide Dissemination Configuration, recognizing the diversity and pluralism in the field of dissemination and the range of institutional types, interests, and approaches that comprise the field of educational dissemination, and urging relationships that emphasize cooperation and accommodation.[26]

Examination of the literature produced by these various groups, and other material on disseminatio policy, suggests that there is disagreement within the dissemination community and among dissemination policy-makers about the form and degree of coordination that may be needed to increase the effectiveness of educational dissemination in this country. Both the DAG and IPOD reports bemoaned the fact that there is no single comprehensive national dissemination system, and both call for planning toward the creation of such a coordinated, integrated nationwide system. The existing fragmentation, overlap, and redundancy in the system are viewed as inefficient. For instance, the IPOD report argues that "Without a coordinating and guiding mechanism, the separate activities are seldom integrated and directed toward common priority objectives." The DAG analysis is concerned that the existing multi-centered strategy creates competition among dissemination programs and that even system-level dissemination issues are being addressed "mostly in a piecemeal fashion."

> The DAG thus has focused its recommendations on steps to be taken to increase the "fit" between the many different, on-going activities at the Federal level, and on bringing about a "fit" between Federal activities and the numerous discrete developments that states, local districts, and private groups are undertaking to improve their dissemination efforts.[27]

The vision they describe is for planning toward a single comprehensive system -- "an overarching plan for integrating all of the various dissemination networks and activities."

However, the "Statement of Agreement by Professionals in the Field of Educational Dissemination" suggests a much looser "configuration" of autonomous agencies and institutions simply cooperating and working together as and when they see fit. And clear opposition to the idea of a single comprehensive system was suggested in some of the policy analyses we carried out for NIE. The gist of our argument was as follows:

> <u>Fail-Safe Mechanisms</u>
>
> In spite of the premium on reinforcing successes and avoiding failures, failures will inevitably occur. There are just too many points of uncertainty and unreliability in the chain connecting R&D to utilization which in combination result in low success probabilities. Further, when the R/D&I system is immature, it becomes imperative that the dissemination system be designed to be fail-safe. That is to say, if the user experiences failure in one instance, he will be aware that other alternatives are available -- as contrasted to the user seeing the dissemination system as a monolithic system, wherein the whole system is deemed useless by the user when he experiences failure with one part of it.

Design Requirement: The dissemination system must be designed so as to provide alternative channels of dissemination to the user.

Stretegies: Strategies should put a premium on redundancy, on making competitive alternatives available to the user. Such redundancy can be achieved in either of two ways:

1. Natural decentralized variation and adaptation: When natural decentralized variation and adaptation are allowed, a variety of alternatives (even redundancy) may become available to the user, and the user is thus less likely to transfer his perception of weakness in one part of the dissemination system to the other parts. The various dissemination mechanisms should, of course, be orchestrated from a higher level, but with a minimum of visibility.

2. A fail-safe centralized system design: While a centralized fail-safe system design is at least theoretically possible, it is complex and thus very difficult to develop and manage. If attempted, it would include:

   a) disaggregated parts;

   b) built-in competition among parts;

   c) built-in redundancy of a few things done well.[28]

Clearly, regardless of what degree of system integration may be possible in the future, we are still a long way off from either a single comprehensive system or a fail-safe centralized system design. Greater coordination and orchestration across agency programs, and across federal, state, and private sector institutions, is clearly called for. However, we would argue, too, that the gains to be expected from redundancy shoudl be borne in mind in the planning and implementation of coordinating mechanisms.

V. THE CURRENT STATE OF DEVELOPMENT OF THE DISSEMINATION FUNCTION'S KNOWLEDGE, INSTITUTIONAL, AND PERSONNEL BASES

The dissemination function appears to be experiencing rapid development of its institutional base, without adequate expansion of the personnel base of trained dissemination specialists or sufficient attention to strengthening the field's knowledge and technology base.

There have been several significant efforts to synthesize the theoretical knowledge bese of the dissemination function.[29] But the translation of this knowledge base into usable strategies with known effects appears to have hardly begun.

The dissemination specialty is a new one, and, although there are many people carrying out dissemination roles, there appear to be relatively few trained dissemination specialists. Most of those currently carrying out dissemination activities appear to be practitioners by training. They are proceeding intuitively and learning the dissemination specialty on the job. The AERA Task Force on Training has identified some of the competencies required for effective performance of dissemination roles.[30] And some new training programs and models for new training programs have been developed to provide formal training for the dissemination specialty.[31] As yet, however, there do not appear to be more than a handful of such train-programs in operation. Consequently, the institutional base is expanding at a rate faster than the personnel base of trained dissemination specialists. The effect of this lack of synchronization is likely to be serious staffing problems for these new initiatives -- either unfilled vacancies, or vacancies filled by poorly qualified personnel. Clearly, if this difficulty is to be overcome, a significant resource investment will be needed in developing the knowledge and technology base of the dissemination function, translating this accumulating knowledge base into training programs, and establishing these training programs on the scale warranted by the scope and rate of expansion of the educational R/D&I dissemination function.

VI. CONTINUING OPERATIONAL PROBLEMS IN EDUCATIONAL DISSEMINATION

The Dissemination Analysis Group's review of dissemination operations pinpointed 11 operational problems on which they recommended that action be taken:

1. Target groups for dissemination (particularly decision-makers) are not identified with sifficient precision.
2. The content and form of much of what is disseminated is of relatively poor quality.
3. Present strategies and methods for dissemination are not likely to achieve high impact.
4. The few mechanisms for practitioner influence and feedback to assist educational dissemination are weak and irregular.
5. Few mechanisms exist for sharing among peers, and between different groups of educational specialists.
6. In spite of the enormous number and variety of educational programs and materials in existence, rarely are alternatives readily available to practitioners.
7. The practical blocks to effective practitioner access to the existing educational dissemination systems are great.
8. The incentives for practioners to use the existing dissemination systems are weak.
9. Evaluation information for judging among relevant alternatives is insufficient.
10. The present dissemination system neglects the support of local development, adaptation, and unique mixes of ideas and materials taken from a variety of sources.
11. The availability to practitioners of locally tailored training, technical assistance, and on-user-site consultation is inadequate.[32]

Their analysis of how near or far away the field is from solving each of these operational problems was most interesting.

While there are no simple solutions to any of these problems, the DAG believes the problems fall into three broad groups:

1. Some have known solutions. The main problem is finding the personnel, resources, and political power to implement the solutions. (The DAG suggests that problems 1, 2, 3, and 5 fall here.)

2. Some have been studied sufficiently to suggest approaches with a high probability of success. In many cases development of these exemplary approaches is underway, and for some, successful demonstrations exist. The task is to extend these successful models. (The DAG suggests that problems 4, 10, and 11 fall here.)

3. The remainder are merely in the conceptual stage, with much more research, development, and searching for exemplary models required. (Probably problems 6, 7, 8, and 9 fall here.)[33]

If their analysis is correct, even with a significant investment of resources it will clearly be some time before the dissemination function in education shows evidence of a high level of maturity.

VII. THE FUTURE

At the present point in time, the dissemination function must be assessed as underdeveloped and weak in its impact on the practice system. If it is to be strengthened, collaborative federal/state/local and private/public initiatives will be needed, designed specifically to take into account the essential requirements of the dissemination function and the current state of development of this function in the field of education.

1. Assessment Basis

The function of dissemination is critical to the entire R/D&I system. It is, in essence, a linkage process which "connects" knowledge producers with knowledge users. Thus, the R/D&I dissemination system must provide formechanisms which: can deterine what is avilable; can sort out the "good" form the "bad"; will allow users to identify and obtain the particular products which are relevant to their needs; can "tailor" products as needed to fit user needs; can motivate users to "try" a product; and can insure effective user implementation and utilization.

Assessment, then, must be made in terms of capacity to achieve and success in each of the above requirements. Overall we would wish to know this with respect to:

a) Extent and quality of "reach" into user systems (e.g., number being reached, the extent of repeat utilization of dissemination services, and user satisfaction with such service).

b) Levels of user awareness and trail of R&D products (existence, character, and evaluative).

c) Contribution to implementation and utilization of R&D products. Since this depended on such other factors as number and quality of products available, user skills and receptivity, etc., the dissemination function can only be assessed as a contributor to the process. This must of necessity be a qualitative evaluation.

d) The existence of a well developed and cooperative network of dissemination mechanisms giving coverage across the national and to the variety of users to be found.

2. Current Status

In education, we find a number of problems and barriers to dissemination. There are an enormous number of users (some 17,000 school districts -- plus teachers, etc), among whom there is wide diversity and variety as to philosophy, interests, perceived needs, etc. Innovations make demands on the time of school personnel (a very practical matter) and generally require "people change" -- factors which can lead to resistance to innovation. Additionally, at least two major factors have tended to create a very poor climate for dissemination in education: (1) a lack of implementation/utilization support to the user; and (2) the perception that the outputs of the (for the most part) newly created R&D system have generally been inferior to existing user-developed products.

In education, there has been a considerable amount of activity that has been called dissemination, and a large number and variety of organizations are involved in some kind of dissemination -- but much of this has been fragmented and scattered (e.g., "add-on" to development projects; successful but separate and discrete dissemination systems for specific categorical programs). As yet, however, there is relatively little coordination of federal, state and local resources nationwide, and no systematic way of tapping into the whole nation-wide resource base. Further, there is not yet a well developed personnel base of trained dissemination specialists. Some federally funded programs have been developed in recent years for training dissemination and utilization specialists, but dissemination mechanisms are expanding far more rapidly and creating a far greater demand for trained personnel than these programs could even hope to keep up with.

3. Key Needs

From an overview perspective, then, the need is for:

a) orchestration of educational R/D&I dissemination from a total system perspective

b) in the short term, facilitating the work of existing dissemination mechanisms and "filling" critical "gaps";

c) in the long term, providing for overall system building (this calls for policies and strategies which are pro-active, not passive or reactive, and which are based on a knowledge of what does and does not in fact exist); and

d) balancing short and long term needs.

More specifically, policies and strategies federal funding agencies will need to be developed in collaboration with the states to focus upon:

a) quality control;

b) mechanisms that can optimize product/dissemination/user "fits";

c) providing users with alternative channels of access to the available resource base (a "mixed strategy" approach).

Keeping in mind the limited level and rate at which users can absorb new input once a dissemination system is established (a facotr which is of critical importance), dissemination policy will need either to expand the dissemination technical assistance capability or slow the rate of dissemination system expansion. To achieve a balanced and appropriate growth rate, ongoing monitoring of the dissemination function will be essential.

FOOTNOTES

1. For instance, see: Richard A Bateman et al., A Projected Role for Marketing in the Dissemination of Products Developed by R&D Agencies, Paper Presented at the Annual Meeting of the American Educational Research Association, 1973; Paul D. Hood, "Dissemination, Distribution, and Utilization of Laboratory Products," in Educational Development: A New Discipline for Self-Renewal, John K. Hemphill and Fred S. Rosenau, eds. (Eugene: Center for the Advanced Study of Educational Administration, 1973); Fred S. Rosenau, The Role of Marketing in a National Institute of Education, Unpublished Report for Planning Conference, April 1972; Linda A. Sikorski and C. L. Hutchins, A Study of the Feasibility of Marketing Programming for Educational R&D Products (San Francisco: Far West Laboratory for Educational Research and Development, 1974) ERIC ED 095625; Gerald Zaltman, The Role of Marketing in Educational Research and Development, CEDAR Conference, July 1973; Philip Kotler, Bobby J. Calder, Brian Sternthal, and Alice M. Tybout, "A Marketing Approach to the Development and Dissemination of Educational Products," Information Dissemination and Exchange for Educational Innovations: Conceptual and Implementation Issues of a Regionally-Based Nationwide System, Michael Radnor, Durward Hofler, and Robert Rich eds. (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977).

2. For instance, see: National Institute of Education, Building Capacity for Renewal and Reform (Washington: NIE, 1973); National Institute of Education, A Concept Paper for the School Practice and Service Division (Washington: School Practice and Service Division, Discrimination and Resources Group, NIE, 1975); NIE, Fiscal Year 1977: Program Plans, Executive Summary (Washington: NIE, January 1976); National Institute of Education. Dissemination and Resources Group, Dissemination and Resources Group Program Plan, FY 1978. (Washington: NIE, August 1976); National Institute of Education, Request for Proposals to Establish an "R & D Dissemination and Feed forward System: A Consortium of R & D Producers Disseminating and Gathering Consumer-Oriented Information About R & D Products and Outcomes" (Washington: NIE, 1976), Radnor, Hofler, and Rich, ed., Information Dissemination and Exchange for Educational Innovations, op. cit.

3. See, for instance: NIE, A Concept Paper for the School Practice and Service Division, op. cit., NIE, RFP to Establish an R & D Dissemination and Feed forward System, op. cit.: Susan Klein, Richard McCann, and Mary Saily, "The R & D Exchange: An Emergency Effort," and Michael Radnow, Robert Rich, and Durward Hofler, "The RDx System: Concepts, Strategies, Practices--An Overview," in Information Dissemination and Exchange for Educational Innovations, Radnor, Hofler, and Rich, eds., op. cit.

4. For instance, see: Interstate Project on Dissemination, Report and Recommendations, (Raleigh: North Carolina State Department of Education, 1976); and Dissemination Analysis Group, Educational Dissemination in Relation to Public Elementary and Secondary Schools: Report of the Dissemination Analysis Group to the Dissemination Policy Council, Preliminary Final Report (Washington: Office of the Assistant Secretary for Education, DHEW, September 30, 1976).

5. Dissemination Analysis Group, Educational Dissemination in Relation to Public Elementary and Secondary Schools, op. cit.

6. IBID.; IPOD, Report and Recommendations, op. cit.; Henry M. Brickell et al., Report of the Dissemination Advisory Committee to the National Center for Educational Communication (Washington: National Center for Educational Communication, Office of Education, 1970), ERIC ED 048 871; Ronald Havelock et al., Recommendations for the Dissemination Program of the National Institute of Education Concerning (1) Needed Research on the Dissemination Process, and (2) Strategies for NIE's Own Dissemination and Utilization Effort (Washington: NIE, 1972), ERIC ED 088 413; also see D. Weiler, The Dissemination of Educational R & D Products: Research and Policy Issues for the Federal Government (Santa Monica: Rand Corporation, 1973).

7. See discussions of this in our chapters on: the historical development of educational R/D & I (the section on degree of system integregation as an indicator of its present state of development); the outputs of educational research and R/D & I; and the implementation and utlization functions in educational R/D & I.

8. William J. Paisley et al., Recommendations for the Dissemination and Utilization Program of the National Institute of Education (Washington: NIE, 1972).

9. Ibid.

10. Dissemination Analysis Group, Educational Dissemination in Relation to Public Elementary and Secondary Schools, op. cit.; IPOD, Report and Recommendations, op. cit.

11. Paisley et al., Recommendations for the Dissemination and Utilization Program, op. cit.

12. For instance, see: John M. Coulson, Toward Establishing an Education Information Dissemination Center (Washington: NIE, 1972); NIE, Building Capacity for Renewal and Reform, op. cit.; NIE, Dissemination and Resources Group Program Plan, FY 1978, op. cit.

13. See especially: NIE, RFP to Establish an R & D Dissemination and Feed forward System, op. cit.; Klein, McCann, and Sailey, "The R & D Exchange: An Emerging Effort," op. cit.; NIE, A Concept Paper for School Practice and Service Division, op. cit., National Institute of Education, FY 1976 Program Budget (Washington: NIE, February 1,

1976); and National Institute of Education, Preliminary Program Plans, FY 1978. Executive Summary (Washington: NIE, July 1976).

14. Ward S. Mason, Carnot E. Nelson and William M. Somers, Federal Funding for Education Knowledge Production and Utilization: KPU Function, By Agency (Washington: R&D System Support Division, National Institute of Education, 1977), p. 18, Table 4. For a discussion of the NAS data base from which these figures have been derived, and how this compares to other funding data bases, see our chapter on the funding of educational R/D&I. Note: the figures shown here are rounded to the nearest million.

15. See for instance: Coulson, Toward Establishing an Education Information Dissemination Center, op. cit.; and Sam D. Seiber, Daren S. Louis, and Loya Mitzger, The Use of Educational Knowledge: Evaluation of the Pilot State Dissemination Program (New York: Bureau of Applied Social Research, Columbia University, 1972), ERIC ED 065 739-740.

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17. NIE, Dissemination and Resources Group Program Plan, FY 1978, op. cit.

18. National Institute of Education, 1976 Databook: The Status of Education Research and Development in the United States (Washington: NIE, 1976).

19. For instance, see the NDN program description in: John A. Emrick, Susan M. Peterson, and Rekha Agarwala-Rogers, Evaluation of the National Diffusion Network, Vol. I: Findings and Recommendations. Final Report (Menlo Park: Stanford Research Institute, 1977).

20. For instance, see the RDx description in Klein, McCann, and Sailey, "The R&D Exchange: An Emerging Effort," op. cit.

21. Dissemination Analysis Group, Educational Dissemination in Relation to Public Elementary and Secondary Schools, op. cit.

22. Ibid.; and IPOD, Report and Recommendations, op. cit.

23. Mason, Nelson, and Somers, Federal Funding for Education Knowledge Production and Utilization: KPU Function, By Agency, op. cit., p. 21, Table 6.

24. Dissemination Analysis Group, Educational Dissemination in Relation to Public Elementary and Secondary Schools, op. cit.

25. NIE, 1976 Databook, op. cit.

26. Richard E. Schutz, "A Declaration of Educational Dissemination," and "Statement of Agreement by Professionals in the Field of Educational Dissemination," Educational Researcher, Vol. 6, No. 10, November 1977.

27. Dissemination Analysis Group, Educational Dissemination in Relation to Public Elementary and Secondary Schools, op. cit., p. 13.

28. Michael Radnor, Harriet Spivak, Durward Hofler, and Earl C. Young, Agency/Field Relationships in the Educational R/D&I System: A Policy Analysis for the National Institute of Education (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1976) pp. 145-146; also see Radnor, Rich and Hofler, "The RDx System: Concepts, Strategies, Practices -- An Overview," op. cit.

29. For instance, see: Ronald G. Havelock, Dissemination and Translation Roles in Education and Other Fields. A Comparative Analysis (Ann Arbor: Institute for Social Research, University of Michigan, 1967), ERIC ED 015 535, published in Knowledge Production and Utilization in Educational Administration, T. Eidell and J. M. Kitchel, eds. (Eugene, Oregon: Center for the Advanced Study of Educational Administration, 1968); Ronald Havelock, A Comparative Study of the Literature on Dissemination and Utilization of Scientific Knowledge (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1968), ERIC ED 029 171; Ronald G. Havelock, A. Guskin, M. Frohman, M. Havelock, M. Hill, and J. Huber, Planning for Innovation Through Dissemination and Utilization of Knowledge (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1969); Michigan Department of Education, Research Implications for Educational Diffusion, Major Papers Presented at National Conference on Diffusion of Educational Ideas (East Lansing: Michigan Department of Education, 1968); and Cresap, McCormick, and Paget, Inc., Developing a Framework for the Dissemination of Educational R&D Products, Report to DHEW, February 1976. There are also at least three classics in the literature that should be consulted: Everett M. Rogers, The Diffusion of Innovations (New York: Free Press, 1962); Everett M. Rogers and Floyd F. Shoemaker, Communication of Innovations: A Cross-Culteral Approach (New York: Free Press, 1971); and Elihu Katz, Martin L. Levin and Herbert Hamilton, "Traditions of Research in the Diffusion of Innovations," American Sociological Review, Vol. 28, No. 2, February, 1963.

30. For instance see the references cited in footnote 17 in our chapter on the personnel base of educational R/D&I.

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Evaluation Personnel in Education (Washington: DHEW, 1970); Colin Mick et al., Development of Training Resources for Educational Extension Services Personnel (Stanford: Institute for Communication Research and Santa Monica: System Development Corporation, 1973), ED 77 534-536; and Bela H. Banathy et al., The Education Information Consultant: Skills in Disseminating Educational Information (Berkley: Far West Laboratory for Educational Research and Development, 1972), ED 071 689.

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33. Ibid., p. 9.

EDUCATIONAL RESEARCH, DEVELOPMENT,

AND INNOVATION: THE INSTITUTIONALIZATION

OF CHANGE IN EDUCATION

CHAPTER THIRTEEN

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CHAPTER THIRTEEN

THE ACQUISITION FUNCTION

THE ACQUISITION FUNCTION

The acquisition function provides the entry point through which externally developed R/D&I innovations, or ideas or information relevant to internal practice-based development of other innovations, gain access to the operating system. We have come increasingly to think of the acquisition function in terms of both these external and internal development processes.

1. For externally developed innovations, the acquisition function represents the critical KP-KU interface between, on the one hand, the dissemination/marketing/distribution outreach activities of KP organizations (or specialized linkage organizations) and, on the other hand, schools or school districts as user organizations.

2. Even if one's focus is on internal development activities, unless one subscribes to the view that all school systems solve their problems or carry out their functions in total isolation from what is going on elsewhere, ideas or information must enter the system somehow -- either a stimuli for the internal development work or as information inputs to that work. Conceived in this way, acquisition refers to the key information flow entry points for inputs to the internal development process from sources outside the particular innovating unit (whether the ideas or information come from a specialized R/D&I organization or from another school, from the community, or some other source).

Conceptually, the acquisition function includes acquisition of information (research findings, "knowledge", etc.) as well as acquisition of package innovations. However, we have already discussed information flows into and within the operating system in an earlier chapter. Therefore, we will concern ourselves here with only the acquisition function as it pertains to acquisition of externally developed (and probably also "packaged") innovation. This point needs to be underscored in order to avoid misunderstanding. We are not saying that external R&D is the only or even the most important source of innovation in schools, or that the acquisition function should be understood only in terms of external R&D. We discuss acquisition here in terms of external R&D only because the material relevant to acquisition processes for internal development was presented earlier in another chapter as part of a broader consideration of information flows. And too, our tendency to discuss what is to be acquired in terms of packaged products, strategies, etc. is due in part to this somewhat artificial bounding off and handling of the material in separate parts of this volume. Some of the points we make about acquisition of packaged innovations are also relevant to the acquisition of information or to acquisition activities relevant to internal development activities. However, we believe that the key points can be made with greatest clarity if we limit the presentation here to the acquisition of (more or less) packaged innovations. Consequently, we have chosen to present the material in these terms.

We include in our definition of the acquisition function all activities of operating system personnel (or their agents) related to the following six processes:

1. developing an awareness of what information, ideas, approaches, or packaged strategies, or products exist to meet a predefined need;

2. searching for more complete information about each approach or packaged innovation (e.g., sources, costs, evaluative data);

3. securing bids from potential suppliers (if relevant);

4. evaluating alternative approaches or products;

5. making the decision to adopt or adapt a particular innovation; and

6. (where necessary) purchasing and securing the innovation.

In this chapter, we consider, first, the available literature -- what it does and does not contain; second, how the acquisition function is carried out in education; third, how this compares to a more idealized model of innovation acquisition; fourth, what issues this suggests in developing policy options and management strategies for restructuring and changing the manner in which innovation acquisition occurs; fifth, how the education context affects the desirability and feasibility of certain options and strategies and suggests additional issues; and finally, what more we need to know before we can: (a) determine where the most viable points of leverage may be for policy intervention, and (b) design workable policies and strategies for improving the effectiveness of the acquisition function in education.

I. THE AVAILABLE LITERATURE

One of the largest blocks of material in the literature on innovation in general, and educational innovation in particular, deals with two aspects of the acquisition function: developing awareness and making adoption decisions. This material is generally referenced under the heading "diffusion of innovations." But clearly, what is studied in the diffusion research tradition is less often the dissemination function (as we described this in the ~~previous chapter~~) than environmental, organizational, and other influences on the awareness process and the making of adoption decisions. The substantive focus of these various analyses tends to be on such matters as: stages in the awareness-to-adoption process;[1] differential characteristics of school systems, their leadership, and community settings that explain differences in adoption rates;[2] real and imagined barriers to the adoption of a given innovation;[3] and the politics of the adoption decision process.[4] Therefore, the literature can be characterized as highly suggestive about some of the influences on the acquisition function, but of relatively little use in providing insight on acquisition processes themselves -- how they are in fact carried out, and how they might be made more effective.

Part of the problem, no doubt, stems from the reality of the acquisition function as it exists -- or more correctly, does not exist -- in the education sector. The purchasing specialty that one sees in industry is either totally lacking in education or, where it does exist, tends to be highly restricted in its scope of activities. For the most part, purchasing personnel in education do little more than handle the paper work of purchase orders and invoices. Where search, analysis of bids, and evaluation activities are included in the scope of purchasing or acquisition operations, they tend to be confined to purchase of conventional supplies and equipment -- e.g., paper, crayons, and chalk, not textbooks, new curricula, or instructional systems.

The most useful material we have seen analyzing weaknesses in acquisition processes, and needed supports for those processes has been produced by NIE staff.[5] Much of this material has been developed as part of the conceptual work that predates, and the planning work currently going on for a possible R&D Exchange program.[6] We will draw heavily on this NIE staff work. It appears from this material that NIE personnel subscribe to a broad view of the acquisition process similar to our own, and have arrived at some of the same conclusions we have about the kinds of R/D&I policies, programs, and strategies needed to support the acquisition function. We hope that our analysis will be useful to the Institute in extending these initiatives.

The descriptive material we present in this chapter is based on bits and pieces in the literature, and our own observations and analysis. Little of this has a strong empirical base. Most of what is in the literature is commentary, judgment, opinion, intuition and the like rather than the findings of systematic research. Much of the same is true of our own observations. Empirical work is sorely needed to verify and extend the material presented here, and to provide the beginnings of a strong literature on the subject around which a needed research area can be developed.

II. EXISTING ACQUISITION PATTERNS IN EDUCATION

1. Lack of an Institutionalized Acquisition Function

The acquisition function is virtually nonexistent in education as a specialized, institutionalized activity. At present, the acquisition entry points are scattered throughout the operating system. The awareness, interest, information search, etc. that bring a new idea, approach, or packaged strategy or product into the innovation decision process may begin with teachers, principals, curriculum specialists, the Superintendent or members of his or her staff, or even parents or community residents. -- virtually anyone in a school system or its environment. This can be a significant source of strength for the acquisition process: the more sources of ideas, suggestions, information, etc., the wider the range of possible new ideas or innovations that are likely to be considered by system decisionmakers, and the better informed the decision process is likely to be. However, a significant weakness of existing acquisition patterns in education is that it is relatively rare to find anyone responsible for initiating and carrying out information or innovation acquisition activities as a major rather than an incidental part of his or her job. Consequently, in the absence of specialized resources allocated to this function, acquisition processes remain largely episodic, haphazard, and random -- not well integrated into system functioning and long-term planning.

To avoid misunderstanding, we should distinguish between the acquisition of conventional supplies, on the one hand, and innovative instructional, organizational, or administrative approaches, strategies or products on the other. School systems generally have business offices or business managers to handle, among other things, the acquisition of conventional supplies such as crayons, chalk, paper, etc. The acquisition process for such conventional supplies appears to be little different from purchasing operations in industry. There are established suppliers, catalogs of offerings, prices, etc. Evaluations about alternative products can be made largely on business grounds (e.g., cost, credit terms, reliability of suppliers, etc.). It generally matters little to the school personnel who use these supplies which particular manufacturer's products are purchased.

Our analysis is not concerned with these conventional school supplies, where marketing and distribution channels are reasonably orderly and where (except in the case of unusually small districts) the acquisition function is carried out by administrative support personnel located in organizational units distinct from instruction and building-level administration. Rather, in our analysis we are concerned with the acquisition of information, ideas, and various forms of packaged innovations that affect instruction, school organization and administration -- areas where technical, professional criteria generally prevail over business criteria in acquisition functioning. In industries with ~~well~~-developed purchasing specialties, purchasing agents have the requisite technical, professional backgrounds and expertise -- large chemical firms, for instance, staff their purchasing units with chemical engineers. Analogous staffing in the education sector would entail recruiting education professionals with R/D&I backgrounds for key positions in innovation acquisition units -- an unlikely prospect given the small supply of education personnel with R/D&I backgrounds, not to mention the limited likelihood of more than a small number of school systems having the resources to support specialized acquisition units.

How, then, are externally developed instructional, organizational, and administrative innovations acquired in the education sector? The literature suggests a number of generalizations that we can make about innovation acquisition processes. We assume the validity of these generalizations applied to specific cases will vary with innovation types, differences in dissemination strategies used and their effectiveness, differences in the kinds of information made available to school systems, and differences among school systems, especially in the extent to which specialized personnel and/or resources are available to support the acquisition function.

2. Developing Awareness of Information, Ideas, or Packaged Innovations

One significant cause of weakness of acquisition processes in education is traceable to the diffuseness of the dissemination and marketing functions in the education sector. The dissemination and marketing system in education is so inadequately developed, so diffuse in structure, and so uncoordinated in channels that the educational marketplace is chaotic in nature and operating system personnel face great difficulties in learning about or evaluating the alternative products on the market or exemplary practices in other school systems that might be used to meet a given need.

A. Written Sources of Information

Professional periodicals are the most extensive source of information about innovations. Empirical data suggest that as many as 300[7] different professional publications are read by educational practitioners in this country. Large numbers of articles in these magazines describe new practices in operation in various school systems, or new products being developed or installed on an experimental basis. Evaluative information, testimonials, data on effectiveness, etc. are often included, in one form or another.

There are, however, several difficulties with this particular awareness channel. The most serious problem is that written sources are not the professional educator's preferred source of information,[8] and there is suggestive evidence that perusal of professional publications is an activity carried out regularly by only a small minority of professional educators.[9] There are other problems as well. The publication channels of professional educators are highly unstructured. There are more and less prestigious publication outlets in different specialties, but there is nothing resembling the "core journal" structure found in many scientific fields.[10] Instead, in the education practice sector there are enormous numbers of periodicals, each read by a relatively small number of subscribers. This clearly complicates the problem of developing widespread awareness -- both from the viewpoint of the information disseminator and the education practitioner.

B. Interpersonal Communication

Interpersonal communication tends to be the preferred information-seeking strategy among education practitioners.[11] But an even smaller minority of professional educators appear to have access to, or make use of, the various informal communication channels existing in the field. Attendance at conventions, seminars, workshops, etc. is the most widely used of these channels. But compared to the large number of school districts and professional educators in this country, the number of districts willing to allocate funds for staff participation in such professional activities, and the numbers of educators who take advantage of such opportunities, appear to be quite small.

Some professional educators, especially school administrators, are well connected to small, informal communication networks that spread information about new developments by word-of-mouth. Often these networks are built around a hub of shared experience -- for instance, past experience as students together in a degree program for school administrators, or as administrators together in a school or district from which some have moved on to other positions, or present experience together in the same district or school system, or on a committee or task force of some professional association. Occasionally, such networks have been intentionally built by organizations concerned with increasing information flow or spread of innovations.[12] But such networks also appear to involve only an infinitesimal part of the sector as a whole.

C. The Role of Colleges and Universities

Colleges and universities play an important role in developing awareness of innovative ideas, practices, and packaged products. However, they tend for the most part to affect the pre-service rather than the in-service training and informing of practitioners.[13] And there is suggestive evidence that the information passed on by most teacher-training or administrator-training programs tends to be about conventional practices, approaches, and materials, rather than innovations.[14]

D. Marketing Approaches

Salesmen and promotional literature, of course, play a very important role in developing awareness of new products, one that should not be underestimated given their coverage of school districts and the persuasiveness of many of the strategies and sales materials they use. However, there is an obvious problem of self-interest and bias here, and a severely limited focus on one or only a handful of different products.

E. The Role of Consulting and Technical Assistance Organizations

Consulting organizations and technical assistance groups are becoming increasingly visible in the education sector. Where such groups are highly knowledgeable and unbiased, and work in the interests of their client school systems to suggest innovations that might solve some of the district's problems, they can be of invaluable assistance. There is relatively little in the literature about these groups as yet.[15] However, it would seem that they are too few in number and are available to too few districts to have much impact on awareness processes to date.

F. The Significance of Linkages to External Resource Systems

There is suggestive evidence in the literature that the awareness process is best developed in those districts that are the most innovative, and that these districts tend to be the ones best linked to the external resource system. These linkages to the external resource system are evidenced in the professionalism of their teaching and administrative staff (as seen in high levels of readership of professional publications, attendance at professional meetings, enrollment in professional courses, etc.); or the leadership orientations and styles of principals or the Superintendent; or the presence of external change agents (e.g., consultants or technical assistance personnel); or especially the existence of curriculum specialists or coordinators on the staff who devote time and attention to determining what materials or other packaged products are available for acquisition, what innovative ideas, strategies or practices might be adapted and implemented, or what research findings or other information exist that might help solve an identified problem.[16] Therefore, it would seem, initiatives to improve the efficiency and effectiveness of the acquisition function must provide more and better linkages to the external resource system -- either through providing more specialized personnel responsible for stimulating and coordinating acquisition activities, or providing more materials and/or technical assistance personnel to provide this stimulation and coordination from outside the system.

3. Searching for Information about Alternative Approaches or Packaged Products

Information search strategies to support the acquisition process tend to be somewhat random and diffuse in the education sector, and therefore highly inefficient. This is attributable in large part to the lack of a well developed information base or efficient information search tools for assembling needed data on: the array of available research findings or other information, strategies, products, variations, etc. to meet a given need; potential suppliers of specific kinds of information or given products or types of products or services; sites identified as demonstrating exemplary practices to meet given needs; costs; facilities, equipment, and training requirements; other descriptive data on given innovations and their implementation requirements; and evaluative data on each innovation's effectiveness on specified dimensions, its side-effects, etc.

There is no systematic mechanism in the education sector to link potential users to all available suppliers, or even to inform the potential user about who these suppliers are or what programs or products they have to offer. There are some catalogs of outputs from individual institutions or groups of institutions.[17] But what educators have needed are catalogs that list the full array of products, exemplary practices, etc. available at a given time or under development to meet specific needs, providing uniform information suggesting how these alternatives compare on relevant dimensions. NIE initiated a program to develop catalogs of all available products and exemplary practices in specific educational areas.[18] The first phase of catalog development was concerned with NIE-sponsored (and before that OE-sponsored R&D) products only; this resulted in the 1976 publication of the Catalog of NIE Education Products. The program was then to be expanded to include both products developed under NIE sponsorship and other non-NIE products and exemplary practices as well.[19]

Packaged innovations and materials present less of a problem for cataloguing and describing uniformly than do exemplary practices that have not been developed for dissemination. There are few systematic procedures for identifying exemplary practices, and, until quite recently, few efforts to document, analyze, and diffuse exemplary practices much less develop materials to assist school systems in adopting or adapting these practices. But here too, OE, NIE and some SEAs have recently begun several important projects along these lines.[20] The NIE project as planned included support not only for the identification, documentation, and verification of exemplary local practices, but also for research "to develop common terminology, procedures and criteria that could be used in the identification, assessment and verification of locally-developed practice."[21] As yet, however, the research component has not been funded.[22]

If NIE-sponsored research projects are at some point successful in developing the needed procedures and terminology, and if the proposed expanded catalogs are designed effectively, if they provide comprehensive coverage and are distributed widely to school districts across the country, then significant steps will have been taken to structure nad make more orderly and efficient and process of searching for information about alternative approaches and materials to meet district needs. However, until these goals are achieved, information search strategies to support the acquisition process are likely to remain diffuse and inefficient. And until that time, it seems highly unlikely that school districts interested in acquiring innovative products or strategies to meet specific needs will be able to assemble the kind of comprehensive decision-oriented information base that will permit them to make rational choices among the full array of available alternatives.

4. Seeking Bids from Potential Suppliers

The bidding process appears to be more relevant to the acquisition of conventional supplies, or to services (e.g., evaluation contracts), than to the adoption of innovative products or strategies: as noted earlier, innovations are selected primarily on technical, professional grounds and on criterial of distinctiveness, rather than on the basis of economic and other business considerations. The bidding process, therefore, is not considered in the literature we reviewed on educational innovation. In areas of school functioning where the bidding process is operative, our observations have uncovered no sector-specific attributes.

5. Evaluating Alternative Approaches/Products

This is probably the most critical point of weakness in innovation acquisition in education. There is relatively little evaluative information about available products and practices to serve as a basis for determining whether or not to replace existing practices or materials with new products or R&D outputs. Even where evaluative information about an approach or a product is made available to potential users, different procedures and criteria are used for validating different products, making comparative assessments difficult, and products validated in one form or another are competing with a large volume of nonvalidated products and practices.[23] Under these circumstances, it is difficult if not impossible for potential users to make rational choices among alternatives. With little evaluative information available as a basis for rational decisionmaking, and few gatekeeping quality control mechanisms to screen out weak innovations, faddism has been characteristic of school system adoption of educational innovations.[24] Adoption decisions have been based on impressions of a single innovation or a limited choice among alternatives, occasionally supported by visits to schools where use of particular products, practices, or programs could be observed and where school personnel involved in the implementation process could be questioned about problems, effects, etc.

One additional problem in the evaluation process should be noted. In cases where evaluative data are provided, the potential user is often faced with the difficulty of interpreting findings phrased in technical statistical jargon (and often the added difficulty of dealing with his own healthy skepticism about the use of statistics for persuasion purposes). Rarely does the potential user have the expertise, or the expert resources available to him, to adequately analyze statistical statements, interpret their meanings and frame the kinds of questions that need to be asked to determine exactly what claims can or cannot be made for an innovation based on available data. Clearly, then, this complicates the problem of evaluating alternative offerings, even when evaluative data are available. As originally conceived, NIE's Consumer Information program (now part of the planned R&D Exchange Program) was to provide needed supports for the acquisition and implementation functions including activities designed to provide uniform, comparative evaluative information across the whole range of products and practices available to meet a given need.[25] However, what this will look like in the future R&D Exchange Program is not entirely clear at this point. Even the probability that there will in fact be a future R&D Exchange Program is far from certain. Therefore, there is no way of assessing at this point the extent to which these proposals are likely to have any future impact on acquisition processes in education, either by providing some order to the educational marketplace or needed supports for the acquisition function.

6. Making Acquisition Decisions

The acquisition decision process is affected by a host of organizational, political, and economic factors that we will consider in a subsequent section on contextual factors that influence the acquisition function. At this point, technical decision problems concern us, notably the insufficiency of information to permit rational choices among alternatives. The decisionmaker is confronted with the difficulty of determining whether or not to replace an existing practice, program, or set of materials with an alternative (or choice among alternatives) proposed for adoption. And he must make his decision in the absence of clear, highly usable information about: what existing theory and empirical research suggest about the specific need he is trying to meet; how this relates to existing practices, etc. in his school or district; what R&D products or programs, or exemplary practices used in other schools or districts are available to meet this need; how alternative approaches, products, practices, etc. compare on relevant evaluative criteria; and what problems alternatives are likely to encounter during the implementation process in his school or district.

NIE's plans for a Consumer Information Component in its R&D Exchange Program were intended to overcome some of these problems. In part, this was to be done by providing the catalogs and comparative evaluative information we considered earlier. But also, the program as originally conceived was to include some activities designed specifically to support the decision process and improve the quality of acquisition decisions. Descriptions of these activities were not very specific, and conceptualization appears still to be in only a rudimentary stage. NIE documents described the strategy as one designed to transform the knowledge base in specific areas (e.g., reading, career education, etc.) into analytical frameworks for use in decisionmaking situations involving adoption or adaptation of innovations to meet specific needs. Expected outputs were described as "pre-decisional resources and procedures needed to help educators identify problems, choose solutions, and make necessary adoptions or adaptations."[26] The strategy assumed that innovation acquisition decisions in the future are likely to involve "planned adaptation" rather than adoption, that decisionmakers need training and/or technical assistance to enable them to make adaptations effectively, and that materials of this kind can provide needed supports for the acquisition and implementation functions if they are disseminated through a training-of-trainers strategy and used with the help of technical assistance personnel.[27] The program is highly ambitious, and rather complex. We have no way of estimating how effectively it will be carried out, if at all, or what its impact will be.[28] But clearly, the program should be monitored closely for what we can learn about strategies involving use of macro level resources to provide support materials to enhance micro level functioning.

7. Purchasing/Securing Adopted Innovations/Products

Once the decision has been made to adopt a particular product or innovation, the difficulties confronted by operating systems in acquiring the innovation tend to vary with the type of innovation (especially the degree to which it has been "packaged" for dissemination) and the state of development of the distribution channels used. Where packaged innovations are distributed by commercial firms, especially large and well established firms such as the major textbook publishers, school systems are not likely to encounter significant difficulties or delays in securing what they ordered. Greater difficulty tends to be encountered with non-commercial firms, for instance R&D organizations distributing experimental materials for the field test of an innovative program under development. The implementation literature attests to the frequency with which implementation difficulties and eventual termination of experimental programs could be traced to problems in production and on-time delivery of materials rather than to inherent weaknesses of the innovation or unique conditions in the implementation setting: the developer's failure to deliver needed materials on schedule made it impossible for teachers to adequately meet the innovation's implementation requirements.[28]

Most difficult of all to "acquire" are the "exemplary practices" and "idea innovations" that are not packaged for dissemination.

Instead, they must be observed or read about, and then translated by the adopting school system into specifications and procedures that permit trial implementation. In such cases, the process of acquiring the adopted innovation involves a more intensive return to the information search stage, an active adaptation/internal development process transforming the adopter's understanding of the innovation into a concrete set of practices, procedures, etc. to be implemented, and perhaps too an interactive exchange of ideas between the internal development team of the adopting system and implementation personnel in other systems that have used the adopted innovation in one form or another.

8. Summary: General Weaknesses in Acquisition Processes in Education.

We have considered a number of aspects of innovation acquisition in education -- who carries out acquisition activities, how they become aware of ideas, information, products and other packaged innovations, what difficulties they face in searching for information about alternatives to meet a given need, especially comparative evaluative data, what problems they encounter in trying to make rational choices among alternatives, etc. Although there is clearly some variability in acquisition patterns, especially between school districts that do and do not have specialized personnel and resources to support the acquisition function (e.g., curriculum specialists), some general comments would seem to be in order about the typical or modal acquisition process in the education sector and its inadequacies. First, the acquisition function is not institutionalized as a specialized activity in education. The awareness, search, evaluation, etc. activities that make up the acquisition process are carried out incidentally and haphazardly by school personnel as part of their instructional and administrative jobs. But it is relatively unusual in school systems to find anyone responsible for initiating and carrying out acquisition activities. Consequently, acquisition processes remain somehat random and episodic, not well integrated into system functioning and long-range planning.

Whatever periodicity is present in acquisition processes tends to reflect the requirements of the annual budget cycle and the planning schedule for fall and spring term changes in school organization and administration. Therefore, if a particular principal decides that a given innovation is to be adopted, he must make his requests to the Superintendent for required budget allocations and organizational changes in accord with this budget and administrative schedule, or else wait until the following budget year or term. However, the acquisition function has no inherent periodicity under these circumstances -- i.e., no specific set of activities undertaken cyclically to set the awareness, search, etc. processes in motion on a periodic basis. Consequently, it is highly likely that there will be no stimulus to begin the acquisition process, and no new approaches or packaged innovations will be adopted or even considered for possible adoption or adaptation to improve school functioning.

Second, the various channels through which school personnel are made aware of ideas or innovations available to meet given needs tend to be inadequate for reaching an audience as large and as widely distributed as the more than two million classroom teachers and school administrators in this country, and persuading them of the need to replace existing practices and materials with particular innovations.

Third, information search strategies to support the acquisition function tend to be highly inefficient in the education sector because of the absence of catalogs listing and providing comparative information about the full array of approaches, products, exemplary practices, relevant information etc. available to meet specific needs.

Fourth, it is difficult for potential users to make rational choices among alternatives because there is little comparative evaluative information about alternatives to meet given needs; and even where evaluative information is available on some offerings, validated products compete with a large body of nonvalidated practices and products.

Fifth, few of those engaged in the search, evaluation, and acquisition decision processes have the specialized skills or expertise needed to search efficiently for in-depth information on particular offerings, to interpret evaluative information about alternative innovations, or to analyze decision choices in terms of the existing knowledge base on specific needs to be met by innovation acquisitions. And few school systems have access to consultants, technical assistance personnel, or other acquisition support resources that could provide the needed skills. Consequently, acquisition decisions are generally made on the basis of limited evaluative information and without much consideration of alternatives that might better meet the system's needs.

There are significant exceptions to this modal pattern in certain categories of acquisitions. Statewide textbook adoption procedures in nearly half the states in the nation are certainly the most notable of these exceptions. We discuss this more fully in a subsequent section of this chapter. Relatively orderly, informed marketplace conditions also appear to exist in the area of tests and measurements. Perhaps this is true because the large-scale K-12 testing industry is dominated by a few major firms. But also, no doubt, an important factor here is the existence and widespread use of an important information search tool, Buros' Mental Measurements Yearbooks,[29] which significantly simplifies the processes of information search and evaluation of alternative testing instruments to meet specific needs.

Educational technology is another area of school acquisitions where more orderly marketplace conditions exist. In part, this may be because hardware marketing and distribution channels, even for school applications, tend to have closer linkages to the broader industrial sector than to educational R/D&I. But equally important, it would seem, is the access school personnel have to consumer testing and product rating organizations that provide comparative evaluative information on alternative products competing to meet the same needs. EPIE (the Educational Products Information Exchange) is an important new organization which provides this kind of service to subscribers.[30]

Although EPIE has also published some comparative analyses in areas of curriculum innovation (e.g., a recent comparison of more than 700 products for career education programs), for the most part there is as yet relatively little that is analogous to the hardware analysis and rating in areas of unconventional achool acquisitions. School systems trying to identify and acquire innovative programs and approaches for instruction, school organization and administration must still cope with all the various problems we have considered in our modal description of innovation acquisition in education.

Comparison with what we might propose as a more ideal model of the acquisition function should underscore the key weaknesses of acquisition processes in the education sector and suggest possible points of leverage for policy intervention. We draw our model in part from normative thinking, and in part from our understanding of the acquisition function as it operates in more mature R/D&I systems.

III. IDEALIZED MODEL OF THE ACQUISITION FUNCTION

Several requirements would seem to be critical to a more ideal model of the acquisition function in user systems. First, the acquisition function would have to be institutionalized -- carried out in an ongoing routinized manner by, or with the support of, specialized personnel, in specialized organizational units or linkage organizations, using resources specifically allocated for acquisition processes.

Second, acquisition personnel would have to be linked effectively to decisionmakers in their organization who determine needs and decide which innovations will be adopted and tried. This requirement assumes that the acquisition function involves operations of significant scale and complexity, and that therefore the services of acquisition specialists are considered an essential part of system functioning and are in considerable demand by system decisionmakers.

Third, acquisition personnel would have to be linked effectively to dissemination, marketing, and distribution channels in the larger R/D&I system, to insure that they have a comprehensive and up-to-date awareness of all existing approaches and packaged innovations available to meet specific needs; who the potential suppliers are for different kinds of packaged innovations, and the reputations of each based on past performance of products and other criteria; what the best sources of information are on specific kinds of data to be provided to the organization's decisionmakers for different kinds of acquisition decisions, especially evaluative information on alternatives; what other organizations have experimented with particular innovations and might provide first-hand insights into the strengths and weaknesses of various alternatives; etc.

Fourth, as a corollary to the preceding requirement, it would seem essential that a well developed system (or systems) exist for dissemination/marketing and distribution of this information and the packaged innovations themselves. We would expect such a system (or set of systems) to include:

- widely circulating and read periodicals, stimulating awareness of relevant information and packaged innovations becoming available, describing their implementation in various settings, etc.;

- informal communication networks among personnel in operating systems, technical assistance personnel, and others with specialized expertise, for exchange of information or for directing those with specific information needs about given innovations (or innovation types) to those who can best answer their questions or provide needed data;

- catalogs of packaged innovations, already available or under development, to meet specific needs, with uniform information on innovation specifications, costs, personnel and organizational requirements for effective implementation, training needs, evaluative data, etc.;

- catalogs of exemplary practices to meet specific needs, with uniform information about where they can be seen in practice, who can be contacted for additional information or for technical assistance in adaptation or implementation, evaluative data validating claims made for these practices, etc.;

- catalogs of potential suppliers of different packaged innovations or innovation types, with background information on organizational capabilities, past track record, present scope of operations, etc.;

- a network of reputable testing and assessment firms or government agencies to assemble the data, publish periodically, and distribute the catalogs described above; and

- efficient distribution channels to insure that information catalogs and packaged innovations ordered by user systems are acquired without difficulty or delay.

Fifth, acquisition personnel should be linked effectively to implementation personnel to secure from them: (1) suggestions on possible approaches, innovations, or materials they would like to try, to meet perticular needs; and (2) feedback on the possible merits and weaknesses of particular alternatives assembed by acquisition personnel through search processes. There is some disagreement in the literature about the importance of implementation personnel participating in adoption decisions -- some viewing it as critical; others seeing it as overrated and unnecessary as long as the installation and trial phase is handled adequately.[31] However, even if implementation personnel are not themselves involved in the decision process, information on their reactions would seem to be important data for decision-makers to have in assessing alternative choices.

Finally, where the acquisition function is operating on an optimal level, we would expect to find acquisition personnel linked effectively to one another, so as to share information and advance the technology of the acquisition function. In various industries, for instance, purchasing specialists have their own professional associations, hold annual meetings, communicate through regularized channels, etc. Consequently, acquisition personnel develop a professional identify of their own and increased familiarity with the informational and technological base of their function, information flows more efficiently, and acquisition processes are carried out more effectively

IV. ISSUES

Comparison of existing patterns of innovation acquisition in education with this idealized model suggests a number of issues that need to be considered in developing strategies for imprving the acquisition function in education.

transferred from other sectors? What kinds of adaptations are needed?

2. Increasing the Efficiency and Effectiveness of Channels for Developing Awareness of Innovations

How can existing channels be used more effectively to increase awareness of innovative products, practices, etc. to meet specific needs?

Which periodicals reach the largest audience relevant to particular types of innovations? What kinds of articles about innovations, providing what kinds of information, in what sorts of formats, are most effective in stimulating interest in different audiences, and persuading them of the potential utility of a given innovation to their school system?

Which conventions and what kinds of seminars, workshops, etc. are attended by the largest audiences relevant to particular types of innovations? What kinds of oral presentations and supporting materials describing innovations are most effective in stimulating interest in different segments of the audience, and persuading them of the potential utility of a given innovation to their school system?

What kinds of informal communication networks are most extensively developed for increasing information flow about new developments? How many school districts are linked to the field's information flow system through such networks, and how effective is the information flow about innovations? What kinds of school districts are and are not linked to such networks, and why?

How many of the existing college and university training programs for school professionals disseminate significant amounts of up-to-date information about specific kinds of educational innovations? (Which kinds of innovations?) How many schools or departments of education provide in-service as well as pre-service training programs? On campus? in the school districts themselves?

How many educational innovations are marketed through extensive campaigns using sales representatives and promotional literature? How many districts are reached through these campaigns? At what costs?

How many consultants, consulting organizations, and technical assistance groups actively attempt to stimulate client awareness of available innovations? (What kinds of innovations?) How many districts make use of these organizations? How extensively does each district use them, for what purposes?

What new channels (if any) should be developed to increase operating system awareness of important new innovations?

Should new periodicals or newsletters be established and distributed free of charge to all school districts? Can widely read existing periodicals or organizations with newsletters be persuaded to add a feature that serves the same function as establishing a new periodical or newsletter? How can this strategy be carried out most effectively and efficiently? What resources would be needed?

Should new workshop programs be developed? Can professional associations be persuaded to take on a significant role in adding such workshops to convention programs and association activities?

What new kinds of networks might be developed, or what existing networks might be linked or expanded, to increase information flow about innovations? How might the networking strategy be achieved most effeciently and effectively? through what organizational arrangements? What resources will be required?

What incentives can be developed to stimulate more active involvement of schools and departments of education in disseminating information about educational innovations? as part of existing training programs? through undertaking new research and service programs?

What strategies can be adapted from the marketing and promotional techniques used by commerical firms to stimulate interest in their products?

What new roles and relationships can be developed for private sector firms with well developed marketing capabilities, to participate in broader macro-level programs to stimulate school system awareness of available innovations?

How can consultants, consulting organizations, and technical assistance groups be linked more effectively to macro-level programs to stimulate awareness of available innovations and to provide support capabilities for evaluating and implementing innovative practices?

3. <u>Design and Use of an Innovation Acquisition Information System</u>

What are the essential design requirements for an information system that can be updated frequently with ease, and that can be used by school system personnel without outside assistance, to locate needed information about:

- alternative strategies, exemplary practices, products, etc. already available or under development, to meet specific needs, including product/innovation specifications, costs, manpower, training, organizational, and facilities/equipment requirements for implementation, evaluative data, etc.;

- exemplary practices to meet specific needs, including where the practices can be seen in operation, who can be contacted for additional information or for technical assistance in adaptation or implementation, evaluative data validating claims made for these practices, etc.;

- potential suppliers of different products or innovations, different product or innovation types, or various technical assistance or support services, including organizational capabilities, past tract record, present scope of operations, etc?

What are the most efficient and effective procedures to use for gathering and updating the needed information?

What is the most efficient and effective mix of printed catalogs and materials, access to informal networks of knowledgeable informants, and access to technical assistance personnel to provide acquisition support services for an innovation acquisition information system?

4. Design of Procedures for Providing Uniform Evaluative Information on Alternative Strategies, Practices, Products, etc. to Meet Specific Needs

What are the essential design requirements for an analytical framework and an efficient, effective set of procedures for evaluating the full array of alternative strategies, practices, products, etc. to meet specific needs? What essential information must be provided about each innovation? What are the most valid and reliable, and also cost-efficient, procedures for gathering and analyzing the required data?

What is the most effective format for reporting this evaluative information on alternative innovations and practices to meet given needs?

What kinds of support materials and technical assistance services may be needed to help school personnel assess this evaluative data base in relation to their needs?

5. Design of Needed Supports for Acquisition Decisionmaking

What supports can be designed to help decisionmakers determine the relative merits of alternative products, innovative strategies, and exemplary practices to meet a given need compared to the effects of existing practices, products, etc. in use in his school -- i.e., to determine how significant a gain, if any, could be expected, on what dimensions, at what costs?

6. Integration of Acquisition Operations with Need Identification, Long-Range Planning, and Top Management Decisionmaking

If acquisition activities are to be carried out by, or with heavy reliance on, organizations or organizational units apart from core operations (instruction, administration) and top management decision-making, what arrangements for institutionalizing acquisition operations in different organizational settings are needed to insure integration of acquisition operations with other components of system functioning? What factors must be present in the relationships between acquisition units and other user system components to provide smooth integration of acquisition operations with need identification mechanisms and data bases, with perceptions and sensitivities of top management decisionmakers and implementation personnel, and with long-range planning operations concerned with user system capabilities, those already existing and others under development?

What are the essential design requirements for an information system that integrates the acquisition data base on potential suppliers and available products, practices, etc. with other system data bases on needs, capabilities, operations, outputs and impact, so that a comprehensive information base is available to inform the acquisition decision process?

V. CONTEXTUAL FACTORS

Innovation acquisition in the education sector is affected by two wholly different sets of influences. Those we have considered up to this point reflect technical weaknesses in acquisition operations in education -- inadequately developed information bases and information search tools, inadequately developed organizational arrangements and linkages to external resources to support the acquisition process, etc. Our analysis has suggested that once these technical weaknesses are overcome and the acquisition function is "rationalized," innovation acquisition processes will become more effective and school systems will be better able to make informed choices among alternative innovations. But will the rate of innovation adoption increase? Will greater awareness of new developments and exemplary practices, and greater ease in finding needed information about these innovations and choosing among them, necessarily lead to greater willingness to adopt, adapt, or experiment with educational innovations in one form or another?

The educational literature presents conflicting assessments of the innovativeness of American schools, judging the schools to be either highly innovative or changing at a stultifying, glacial pace, depending on the sources of the data and the criteria used.[32] But regardless of the conclusions reached, the literature is quite consistent in presenting a picture of enormous barriers to change that are peculiar to this particular context. Unless some strong incentives are developed to overcome these barriers, there seems little point in considering policy interventions to rationalize the innovation acquisition process: many of these obstacles to change are so significant that there is little to speak of as an innovation acquisition process to be rationalized in most school districts -- little if any thought of instituting changes, and a climate generally unsupportive of changes suggested by others.

At least seven sets of contextual factors need to be considered to understand the distinctive setting of the innovation acquisition function in the education sector: (1) the monopolistic nature of public schools; (2) their social and political vulnerability to environmental influences, real or imagined; (3) the nature of their governance structure; (4) legal constraints on innovation acquisition; (5) economic constraints on innovation acquisition; (6) the nature of educational innovations themselves; and (7) the relative absence of change agents in the education sector. We shall consider how each of these factors inhibits the adoption, adaptation, or even consideration of innovations in the education sector, and what additional issues therefore must be considered in designing workable policy options and strategies to increase school system receptivity to innovation acquisition.

1. Monopolistic Nature of Public Schools

For most parents in most communities, the local public school has a virtual monopoly on the provision of schooling for their children. Relatively few communities offer parents an opportunity to choose from among the schools in their district. And the other types of alternatives -- sending one's children to parochial schools or other private schools or moving to another community with better schools -- are open to only a small minority of families, i.e., Catholic families living in communities with local parish schools, or families with sufficient income to permit them to pay for private schools or the move to a community with notably good public schools.

One observer has described the consequence of this monopolistic position of the schools as turning them into "domesticated organizations," i.e., organizations "protected and cared for in a fashion similar to that of a domesticated animal."[33] Public schools do not have to compete for clients or for basic operating funds. Neither their survival nor their budgets are tied to the adequacy of their performance. Schools do not have to be concerned about being put out of business, even if their performance is viewed by their clients as unacceptable, and even if their performance declines year after year. The number of students enrolled in a school is unrelated to market forces: the steady stream of "clients" is assured by compulsory school attendance laws and geographic zoning that shifts school boundary lines in accord with demographic changes in the neighborhood population. As members of a self-perpetuating bureaucracy,[34] the careers of educational personnel are protected, regardless of job performance. Competence, at least until recently, has been judged entirely by certification requirements tied to training rather than performance. Tenure has given somewhat permanent protection to those education professionals "certified" and employed beyond a short probationary period. Consequently, there is little incentive to adopt innovations that might improve performance.

2. Vulnerability to Environmental Influence

Whether or not a given innovation is adopted in a particular community tends to be determined as much by community attributes as characteristics of the innovation itself. In our earlier chapter on environmental constraints in the education sector, we considered at great length how vulnerable school systems are to environmental influences. This vulnerability takes on particular significance in its impact on the innovation adoption process.

External pressures can be a major impetus to stimulate change in school systems. Strong public dissatisfaction with the schools, for instance, may prompt school officials to seek innovations that will allay discontent. Often this may mean only a facade of change while nothing of fundamental significance is altered. But often, substantial changes may in fact be instituted.

A reputation for innovativeness in their schools may be an attribute that is highly favored by residents of some communities, stimulating school professionals to remain aware of new developments and acquire new strategies, approaches, etc. likely to maintain that reputation, and the public's support. However, environmental pressures are even more likely to impede than to facilitate innovation. Although there are a significant number of communities that take pride in the innovativeness of their schools, a far greater number, perhaps the overwhelming majority, tend to be conservative about their schools, and suspicious of fundamentally different approaches to what schools should look like and how they should perform their basic instructional functions. There has been a strong "back-to-basics" movement in this country in recent years, emphasizing traditional approaches and the "3R's," and calling for elimination of innovative "frills."

School personnel are highly sensitive to negative reactions from the communities in which they work. Fear of criticism from the public appears often to be so strong that even the untested perception of school personnel that the community (or some small vocal portion of it) may question a change from existing practice to one or another exciting new development is sufficient to block change or even the preliminary stages of seeking information about innovations that might be adopted to meet district needs. There is suggestive evidence that the expectations school personnel have about likely negative community reactions tend to be stronger than actual community reactions, as seen in cases where the district decides to go ahead with an innovation acquisition despite anticipated public reaction, or where without incident administrators in a district institute a change that is not considered in a comparable community for fear of public reaction. Clearly, then, the vulnerability of school systems to environmental influence can be as much an imagined barrier as a real barrier to change.[35]

3. Governance Structure

In the education sector, innovation acquisition decisions are organizational decisions influenced by diverse, multiple layers of a system's structure and significant environmental constraints. The decision process is far more complex, then, than it would be in a sector such as agriculture where an individual farmer is relatively free to choose on his own whether or not to adopt a given innovation.

School systems are complex bureaucratic organizations, governed by lay boards of education, influenced by community pressures, and restricted in some decision areas by legal constraints imposed by state and, to a lesser extent, federal authorities. We considered the governance structure previously, in our chapter on environmental constraints in the education sector. We noted there particularly how the extreme decentralization of the governance structure complicates the process of trying to diffuse an innovation to the 17,000 or so school districts in this country: each district is reasonably autonomous in deciding whether or not to substitute a new strategy for existing practices; and within districts there is often a substantial amount of autonomy, down to the school building level or even sometimes the classroom level, in determining whether or not to adopt proposed changes. But what is the effect of this governance structure on innovation acquisition from the viewpoint of potential adopters of a given innovation? And just how strongly does lay control of the governance process affect the receptivity of school systems to innovation adoption?

Clearly, the governance structure makes each district highly autonomous in deciding on innovation acquisitions. Although there are some state regulations that constrain district decisionmaking, they tend to be relatively minor as constraints on innovation. Generally, they are designed to uphold minimum performance standards and tend to involve such usually unobtrusive problems as teacher certification. Where truly innovative approaches are involved, these regulations may present serious obstacles -- e.g., in the case of an innovation that employs personnel who are not professional educators (for instance, professional artists or musicians). But often, there are ways to get around these difficulties if district administrators are persistent and resourceful enough. There are areas of regulation in some states that do present major difficulties for innovators, e.g., statewide textbook adoption procedures that we will consider shortly. And acceptance of federal funds for certain innovative programs tends to mean acquiescing to federal guidelines restricting not only how the money can be spent but also a number of aspects of school system functioning (e.g., matters relating to discrimination, desegregation, affirmative action, etc.). Rarely, however, are such regulations of major significance in affecting innovation acquisition decisions.

The educational literature contains conflicting assessments of the impact of lay control on innovation adoption decisions. One group of writers describe educational systems in terms of organizational vulnerability to social and political influence: the outcomes of adoption decisions are viewed as reflecting the pluralism of American society, and professionals' initiatives are seen as significantly constrained by local values, mores, etc.[36] Others, however, contend that lay control of education is one of the many myths that infuse the American educational system, and that in fact school superintendents, their professional staff, and influential professional power blocs such as the teachers' unions tend to dominate lay boards of education and generally resist lay encroachments into key decisionmaking areas.[37]

Both pictures are partially true. Even where school boards attempt to closely monitor and control school system operations, they are usually dependent on the Superintendent and his staff for information and expertise, and generally accede to the Superintendent's initiatives, proposals, and requests. And even where school professionals are most dominant and school boards function largely as rubber stamps, care must be taken to avoid stirring up undue community hostility to a program or proposal.

The absolute amount of lay/professional dominance vs. subordination, then, may be a moot point. However, there would seem to be far more barriers to change inherent in the governance structure of the educational system in this country than other sectors we have considered elsewhere in our analysis.[38]

4. Legal Constraints on Innovation Acquisition

Our discussion of innovation acquisition in this chapter tends to assume that school districts are reasonably free to choose innovations from among the full array of alternatives available to meet a given need. However, there are significant legal constraints on the textbooks and other learning materials that school districts can acquire in many states and localities across the country.

Nearly half the states, for instance, have statewide textbook adoption procedures. The procedures vary from state to state. In some states, a single textbook is adopted per subject per grade, and school districts have no choice at all. In others, a number of acceptable alternatives are listed by state authorities, and districts may choose from any of the books on the list.[39] However, even where choice is possible, the choices tend to be relatively narrow compared to the wider array of all available alternatives to meet a given need. Even in states without such statewide textbook adoption procedures, the effect generally tends to be the same in large urban areas organized as single city school districts with centralized selection and purchase of textbooks and learning materials.

Most of these regulations are concerned only with textbooks. But in some states the regulations also cover "consumables," i.e., materials such as student workbooks that cannot be used more than once.[40] Where regulations of this kind are in effect, school systems are prevented from adopting instructional systems (e.g., reading or mathematics programs) that are dependent on use of such materials -- unless they try to get around these regulations, for instance by using the workbooks year after year, having students copy the required exercises on separate paper, etc. But even if this kind of stratagem is tried, much of the efficiency of the instructional system, as designed, is lost.

The very existence of these kinds of statewide or citywide adoption procedures acts to impede change. Textbook publishers, for instance, trying to produce books and materials acceptable to as large a national market as possible, knowing their materials will be screened by generally conservative bodies of officials in states with widely varying sensitivities, are not highly likely to produce materials that are too innovative, or even too "different" looking.

5. Economic Constraints on Innovation Acquisition

Given the financial problems of school systems in recent years, cost considerations have become a factor of major importance in the acquisition process. If a new product or approach is less costly than the one it replaces, adoption probability is enhanced. But innovations are rarely cost-reducing. Often, they are quite costly, and the problems are complicated by the "soft money" funding patterns frequently used to encourage the diffusion of certain types of innovations.[41] Federal money may be offered as an incentive to school systems to adopt and utilize a complex instructional system that requires major restructuring of a school's instructional and administrative processes. The federal money pays for all costs of a three-year installation and trial period. However, after the trial phase, the federal money flow terminates and the costs must be absorbed by the local school district. The school faces a serious dilemma: either it must take the added costs out of its already tight operating budget, or, after having restructured the school's instructional and administrative processes in accord with the innovation's requirements, it must drop the program and perhaps again go through the strains of restructuring, this time to return to the old pattern. Unhappy experiences of this kind make school districts wary of adopting innovations supported by "soft" funding.

6. Nature of Educational Innovations

We have considered the problems posed by the nature of educational innovations at a number of points in our analysis.[42] As we have noted elsewhere, by their very nature educational innovations present significant barriers to ready acceptance by school personnel. They tend to involve "people change," i.e., unlearning of old patterns (of instruction, classroom organization, etc.) as well as learning of new behaviors, techniques, etc. Those innovations that involve truly fundamental changes are likely to run counter to strongly held feelings and sensitivities about the roles of teachers, students, parents and others, the relationships among them, etc. They are likely to involve costly and time-consuming retraining of teachers. And their adoption is likely to require substantial commitments to be made despite considerable uncertainty about what the outcomes will be.

It is this uncertainty that is probably the most significant, and certainly the most reasonable, source of resistance to adopting innovations. By their very nature, educational innovations tend to be harder to evaluate than innovations in other sectors. Their effects are less visible, harder to measure, and may take many years to assess. There is greater reactiveness between product (i.e., the "packaged" innovation) and users (i.e., both educational personnel as intermediate users and students as end users), and therefore the implementation process is more complex, involving a far greater number of variables; it is harder to predict; and harder to control.

We noted earlier in this chapter how little comparable evaluative information is available about alternative products, innovations, and practices to meet a given need, making it necessary for acquisition decisions to be made in the absence of data of this kind or data comparing existing practices, etc. in a school system with innovations proposed for adoption. Consequently, the potential user is likely to be hesitant about risking resources on so uncertain an outcome.

7. Relative Absence of Change Agents

The education sector lacks much evidence of the entrepreneurial role that has been so important in the historical development of R/D&I in other sectors, as we described this role in another of our analyses.

Education lacks a significant number of individuals or organizations willing to "take risks, tolerate uncertainty, and counteract resistance in order to introduce an innovation" or initiate new activities.[43]

There are relatively few innovators in education establishing their own organizations, or devoting their energies to promoting specific approaches or innovations that will be adopted only if school personnel can be persuaded to take a chance on something new. There are few if any incentives for such organizations to be established, and relatively few sources of funding to permit such organizations to survive during a seed period until they can become self-sustaining, supporting themselves on what little income can be derived from such enterprises in the education sector.

There are few sources of change within educational systems. School principals, for instance, tend to function as administrators rather than as educational leaders.[44] Much the same can probably be said of most school superintendents, or even curriculum coordinators or other specialized personnel staffing administrative positions. Increasing numbers of external change agents have appeared on the education scene in recent years, supported by federal funds or by private foundations. And there is some evidence that external change agents, if prestigious or well-connected, and if effective in relating to school personnel in a non-threatening manner, can be highly influential in stimulating and supporting innovation.[45] But there is also considerable suspicion of external change agents, who are frequently viewed as threats to the educator's claim of expertise,[46] or (often correctly) as naive outsiders with little classroom experience and limited understanding of the constraints on school system functioning.

With few incentives in the education sector to stimulate risk-taking behavior, and strong bureaucratic constraints that discourage risk-taking, educational systems tend to lack the major forces that are supportive of innovation in other sectors where strong market forces are operative, or where influential change agents function effectively.

8. Policy Considerations Suggested by Educational Contextual Factors

These various contextual factors distinctive to the education sector suggest additional issues that need to be considered if policies are to be designed to make school systems more receptive to innovations, and therefore more supportive of innovation acquisitions.

What incentives can be designed to increase school system interest in experimenting with innovations that may improve their performance?

What, if any, market forces or other competitive models might be introduced validly into school system functioning?

What, if any, bureaucratic incentives can be developed to support innovation?

What economic incentives can be developed to increase the appeal of innovations to financially hard-pressed school districts?

What professional forces can be brought to bear on school leadership and instructional personnel to increase their interest in experimentation with innovations to meet specific school system needs?

What strategies can be designed to overcome the major barriers to adopting innovations?

What strategies might be designed to make community influentials and parents more receptive to validated innovations?

What strategies might be designed to overcome school professionals' hesitancy about particular innovations, based on untested assumptions of negative community reactions?

What strategies can be designed to help school districts secure needed leeway for innovation acquisitions in states or cities with textbook adoption procedures or other such regulations that conflict with the requirements of particular innovations?

What funding strategies can be designed to overcome the problems for innovation acquisition posed by "soft money" policies?

What strategies can be designed to minimize the uncertainties inherent in the innovation acquisition decision process? (e.g., strategies considered earlier to provide comparative evaluative information across the full array of alternatives available to meet a given need)

What strategies can be designed to increase the visibility and effectiveness of the change agent role? within the school system in existing leadership positions? in specialized change support units within the school system or in external technical assistance or other linkage organizations? in external organizations such as universities, consulting firms, etc.?

What incentives and strategies can be designed to develop the entrepreneurial role in the education sector, entrepreneurial organizations that promote innovation dissemination and acquisition, and risk-taking behavior in those who make innovation acquisition decisions?

How can each of these various strategies be implemented most efficiently and effectively?

VI. NEXT STEPS

1. Needed Research

Before we can design incentives to stimulate risk-taking, entrepreneurship, and innovation acquisition in education and policies and strategies to improve innovation acquisition operations, a number of questions must be answered systematically through research.

During the initial phase of the research program, it would seem essential to assess the relevance of the vast body of diffusion research and organizational change literature for application to the educational context.[47] What seems to be called for is the development of a comprehensive inventory of testable propositions bearing on barriers to change processes and how they might be overcome, incentives that might be developed to stimulate innovation and school system receptivity to innovations, and policy options and management strategies for improving acquisition operations in the education sector. This is essentially a literature review and translation task that could probably be carried out in a short period of time with little or no difficulty by one of the research organizations that has long been reviewing, annotating, synthesizing, and applying this literature (e.g., the Center for Research on the Utilization of Scientific Knowledge, or Research for Better Schools).

In the second phase of the research program, empirical research needs to be undertaken to: (a) test the validity of some of the more important of these propositions in the educational context, and (b) gather and analyze an empirical data base on innovation acquisition in education. At the very least, we envision a survey (or set of surveys) of school systems, possibly linked to a planned or ongoing survey effort such as NIE's survey of school practices.[48] We would expect such a survey effort to enable us to determine what the existing patterns of innovation acquisition look like, how much variability there is in these patterns, how powerful each of the major barriers to innovation are in different kinds of community and school district settings, and how personnel in different kinds of settings react to various hypothetical possibilities presenting strategies that might be developed and implemented to enhance innovation acquisition in the education sector. More specifically, we need to gather data on:

- the levels and types of innovation acquisitions characterizing school systems in different kinds of communities, with different kinds of needs, different kinds and levels of resources allocated to innovation acquisition operations, different legal, economic and other constraints on the innovation acquisition process, etc.;

- the key innovation entry points in each system (i.e., which personnel in the school system or its environment are the main sources of proposals for innovation acquisitions);

- the types of awareness channels used most extensively by different kinds of personnel, in different kinds of organizational and community settings, in relation to different kinds and quantities of innovations adopted or even seriously considered for adoption;

- the types of information search strategies used most extensively to get more information about different types of innovations; the extent of use of available information resources; feedback on the degree to which different kinds of resources, different formats, etc. were or were not helpful, were used with great ease or difficulty; perceptions of information needs, and preferences for different types of information and support resources that would be most helpful;

- types of evaluative information sought and used in making innovation acquisition decisions; numbers of alternative products considered in relation to the number available in the full array of innovations, practices, etc. to meet specific needs; approaches used in comparing existing practices, products, etc. to innovations proposed as replacements; types of evaluative information desired; types of evaluation interpretation and support resources seen as needed; and

- reasons for adopting or rejecting particular innovations considered in recent years.

A second-stage analysis of these data might categorize the participating districts as high, moderate, or low on innovation acquisitions of different types, and then compare the three sets of districts on each block of items. This kind of analysis might yield highly useful insight into the structural and process differences (as well as the frequently reported community differences) that distinguish and help explain differences among school districts in innovation adoption rates. We would be particularly interested in seeing analyses that might indicate the relative importance of community vs. school factors, and the relative importance of such school factors as <u>technical</u> barriers to acquisition (e.g., weaknesses in awareness channels, in information search strategies, in available evaluative information, in decision processes, etc.) and <u>motivational</u> barriers to innovation acquisition (e.g., resistance to change as unnecessary or too demanding of staff time, fear of community reaction to a proposed change, etc.).

Another research possibility might be the analysis of innovation acquisition processes in school districts reputed to be highly innovative. Exemplary cases might be identified from the survey data, i.e., they might be selected from among the districts categorized as high in innovation acquisition. Or they might be identified in "quick and dirty" fashion using knowledgeable informants to suggest where some of these exemplary cases might be found. Research on these exemplary districts might provide: (a) in-depth documentation of individual exemplary cases, and (b) cross-case analyses of acquisition patterns, channels used, information search strategies, evaluative information sought and used, types of innovations sought, accepted, and used, reasons for adopting or rejecting particular types of innovations, etc. We are particularly impressed by the possibilities of this kind of research,[49] and discuss it elsewhere in this volume.[50]

2. Policy Choices

Based on the findings of the research effort, decisions can be made as to whether or not a substantial investment in the acquisition function is warranted at this time, and if so, what form this investment should take, whether it should focus on macro level resource development or micro level capability building (or both), what kinds of districts it should focus on, etc.

3. Design Work

If the decision is made to support the strengthening of the acquisition function at this time, several kinds of design work would seem to be needed. Given the considerable variability among school districts in existing acquisition patterns and preferences, and in degrees of organizational readiness for more mature modes of institutionalized acquisition operations, it would seem essential for the design work to be oriented toward constructing alternative models to achieve each of a number of key objectives: (a) to develop incentives that can stimulate innovation acquisition and overcome major barriers to innovation acquisition in different organizational settings; (b) to institutionalize innovation acquisition operations in, or acquisition support services for, different organizational settings; and (c) to provide capability building activities required to implement these various models, starting from existing patterns and progressing toward more optimal patterns of acquisition functioning.

Presumably, the design work would be carried out to a level of specificity sufficient to permit school systems to select and implement any one or set of these models on a trial basis. It would seem essential to include LEA personnel throughout such a design effort, whether in a staff or an advisory capacity (or both). A considerable amount of this work might even be carried out by LEAs, with or possibly even without the collaboration of outside consultants or R/D&I organizations.

The design work might be focused on the possibility of institutionalizing innovation acquisition as a function at the school district level. Or, it may be taken as a given that institutionalization of an innovation acquisition function is highly unlikely in most school districts for some time to come, and that what is needed instead is the development of centralized informational resources that would make more orderly, information-based acquisition operations possible even in the absence on an institutionalized acquisition function on the local level. (The Consumer Information Component of NIE's R&D Exchange Program[51] seems to be oriented toward this latter perspective.) Or, a long-range design program might start from the assumption that institutionalized acquisition operations on the local level may be possible in the long run but are less likely in the short run and therefore the full sequence should be planned for. Whatever decisions are made on these options (based on the findings of the initial research effort), some kind of design work can be carried out -- whether designing for local acquisition specialists, for centralized acquisition resource development, or for both.

4. Trial Implementation and Implementation Research

Whatever models were developed would have to be experimented with somewhat cautiously. Several trials and adaptations would likely be required. Given how relatively little we know about innovation acquisition processes in education or about implementation requirements for the institutionalization of an acquisition function, it would seem essential to include within the trials provision for an extensive amount of third-party documentation and analysis of processes. Such implementation research could be expected to provide information about the relative merits of alternative models of the innovation acquisition function, their relative effectiveness in different kinds of organizational settings, adaptations needed in the models for use in certain kinds of settings, required implementation conditions and implementation supports, and perhaps too information about schools and school districts as innovation systems.

5. Development of Implementation Supports

Finally, if the outputs of the design work are to be implemented widely and effectively, it would seem essential to apply the findings of this implementation research to the development of packaged materials and interpersonal technical assistance services to support the implementation of these various models, in different kinds of organizational settings, starting from different degrees of organizational readiness for more mature patterns of acquisition functioning. Packaged materials, for instance, might include elaborately documented descriptions of the alternative models, with detailed how-to-do-it guides; checklists for assessing existing patterns, resources, capabilities, information needs, etc.; analyses of needed skills and capabilities, with resource guides providing alternative approaches for developing them; self-evaluation instruments for assessing progress made toward more optimal levels of functioning, etc.

We assume such development work would benefit considerably from the involvement of SEA and/or LEA personnel who participated in some of the trial implementations as well as some other SEAs and/or LEAs considering future implementation.

We recognize that institutionalization of an innovation acquisition function is highly unlikely in most school districts for some time to come. However, there are already some programs in planning and others in operation that provide acquisition support resources and services for school systems. NIE's development of an education product catalog and the planning toward an R&D Exchange Program are two examples. OE's National Diffusion Network is another case in point.

Even this approach, which assumes a minimum of institutionalized acquisition functioning, requires the development of implementation supports if it is to have substantial impact on the local level. At the very least, work needs to be done to orient LEA personnel toward the use of these resources and to make them knowledgeable in the use of these resources, to provide mechanisms that might facilitate linking local personnel to these centralized resources, and perhaps too to develop strategies that might enable technical assistance groups to help local districts to use these resources most effectively.

VII. CONCLUSIONS

The acquisition function is virtually non-existent in education as a specialized, institutionalized activity. Acquisition processes are generally episodic, haphazard, and random. They are rarely well integratedinto system functioning and long-range planning. The information dissemination system in education is diffuse, making it difficult for educational personnel to become aware of new products or programs or to locate more information about a product or program they do become aware of. Information search strategies tend to be inefficient because.

needed information bases are not adequately organized to facilitate the search for information on new programs or products,

It is difficult for school systems to make rational acquisition decisions because there is little comparative evaluative information about alternative programs, products, or practices to meet a given need. Educational acquisitions are subject to faddishness due to the relative absence of gatekeeping quality control mechanisms that can screen out low quality innovations.

Few school districts have personnel (or access to outside consultants) with the specialized expertise to efficiently search for information about alternatives to meet a given need, to interpret evaluative information about available alternatives, or to assess decision choices in relation to the existing knowledge base on specific needs that might be met by innovation acquisitions.

Many of the newer initiatives to provide supports for innovation acquisition in education focus on overcoming these technical weaknesses in acquisition processes in education. They focus on increasing the availability of needed information on innovations that might be acquired, or upgrading the skills needed to use that information effectively.

In addition, the literature suggests that innovation acquisition in education may be significantly affected by motivationalbarriers to innovation. These are traceable to: the monopolistic nature of public schools, their social and political vulnerability to environmental influences (real or imagined), the governance structure of public education, the nature of educational innovations themselves, and economic constraints. The argument here is, basically, that there are few incentives in education to stimulate risk-taking and strong bureaucratic constraints that discourage it. If this motivational factor is in fact as important as it is depicted in the literature, then strengthening of the innovation acquisition function in education will require development of incentives to encourage innovation and strategies to overcome the major barriers to innovation.

If one accepts the basic premise of educational improvement strategies, that educational practice in this country can and should be improved, then the strengthening of the acquisition function must become a major concern. It makes no difference whether one favors external R&D or internal renewal strategies. The acquisition function need not be thought of only in terms of acquisition of externally developed R&D products or programs or exemplary practices from other school districts. Unless one assumes that internal renewal approaches are (and should be) devised full-blown by drawing on internal resources only, with little if any information needed from outside a given school or school district, then the health and vitality of acquisition and information entry points are likely to be significant in separating highly active, effective self-renewing systems from relatively static systems that give only lip service to the self-renewal concept. Clearly, the acquisition function needs to be strengthened in the education sector. Just how this can be accomplished most efficiently and effectively remains to be seen. But unless we begin to accumulate the needed data base on existing acquisition operations, and begin to consider a program of support for some design options, trial implementation, and implementation research, the substantial gap between research, R&D, and exemplary practice, on the one hand, and standard educational practice, on the other, is likely to remain.

FOOTNOTES

1. The classic on this subject is: Everett M. Rogers, Diffusion of Innovations (New York: the Free Press, 1962).

2. For instance, see: Paul R. Mort, "Studies in Educational Innovation from the Institute of Administrative Research: An Overview," in Innovation in Education, Matthew B. Miles, ed. (New York: Bureau of Publications, Teachers College, Columbia University, 1964); Richard O. Carlson, "School Superintendents and the Adoption of Modern Math: A Social Structure Profile," in Miles, ed., Innovation in Education; op. cit.; Matthew B. Miles, "Innovation in Education: Some Generalizations," in Miles, ed., Innovation in Education, op. cit.; Richard O. Carlson, Adoption of Educational Innovations (Eugene: Center for the Advanced Study of Educational Administration, University of Oregon, 1965); and Arthur D. Little, Inc., A Model for Innovation Adoption in Public School Districts: Research on the Characteristics of Selected School Systems as They Relate the Need for Appraisal, Acceptance, and Use of Innovations (Boston: Arthur D. Little, Inc., 1968).

3. For instance, see: Richard O. Carlson, "Barriers to Change in Public Schools," in Change Processes in the Public Schools, Richard O. Carlson, et al (Eugene: Center for the Advanced Study of Educational Administration; University of Oregon, 1965); Roland J. Pellegrin, An Analysis of Sources and Processes of Innovation in Education (Eugene: Center for the Advanced Study of Educational Administration, University of Oregon, 1967); Seymour B. Sarason, The Culture of the School and the Problem of Change (Boston: Allyn and Bacon, 1971).

4. For instance, see: Ernest R. House, The Politics of Educational Innovation (Berkeley: McCutchan, 1974); Research for Better Schools, How Instructional Innovations Get Into Schools: A Review of Research Findings (Philadelphia: RBS, 1973); John Pincus, "Incentives for Innovation in the Public Schools," Review of Educational Research, Vol. 44, No. 1, Winter 1974; and J. Victor Baldridge and Robert Burnham, The adoption of Innovations: The Effect of Organization Size, Differentiation, and Environment (Stanford: Stanford Center for Research and Development in Teaching, Stanford University, 1973); Daryl Hobbs, "Facilitating the Change Process in Agricultural Education," in The Oregon Studies in Research, Development, Diffusion, and Evaluation, Volume II: The Literature of Educational RDD&E, Bette C. Porter, ed. (Monmouth, Oregon: Teaching Research, Division of Oregon State System of Higher Education, 1972).

5. For instance, see: National Institute of Education, Building Capacity for Renewal and Reform (Washington: NIE, 1973); and National Institute of Education, A Concept Paper for the School Practice and Service Division (Washington: NIE, April, 1975).

6. For instance, see: National Institute of Education, Request for Proposals to Establish an "R&D Dissemination and Feedforward System" Washington: NIE, 1976).

7. Saul Herner, Janet D. Griffiths, and Mary Herner, Study of Periodicals and Serials in Education: Final Report (Washington: Herner and Co., 1968), ERIC ED 017 747.

8. For instance, see M. H. Chorness, C. H. Rittenhouse, and R. C. Heald, Use of Resource Material and Decision Processes Associated with Educational Innovation: A Literature Survey (Berkeley: Far West Laboratory for Educational Research and Development, 1969), ERIC ED 026 747; M. H. Chorness and C. H. Rittenhouse, Decision Processes and Information Needs in Education: A Field Survey (Berkeley: Far West Laboratory for Educational Research and Development, 1969), ERIC ED 026 748; and Carl H. Rittenhouse, Innovation Problems and Information Needs of Educational Practitioners (Menlo Park: Stanford Research Institute, 1970), ERIC ED 040 976; Richard S. Farr, "Knowledge Linkers and the Flow of Educational Information," in The Oregon Studies, Vol II, op. cit; Paul D. Hood, "Dissemination, Distribution, and Utilization of Laboratory Products," in The Oregon Studies, Vol. II, op. cit.; Pincus, "Incentives for Innovation in the Public Schools," op. cit.; Launor F. Carter, "From Research to Development to Use," in The Oregon Studies, Vol. II, op. cit.; Carlson, Adoption of Educational Innovations, op. cit.; Ronald G. Havelock, A. Guskin, M. Frohman, M. Havelock, M. Hill, and J. Huber, Planning for Innovation through Dissemination and Utilization of Knowledge (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1969); Edward R. Glaser, "Research Frontier: Utilization of Applicable Research and Demonstration Results," Journal of Counseling Psychology, Vol. 12, 1965; and Malcolm Richland, Traveling Seminar and Conference for the Implementation of Educational Innovations (Santa Monica: System Development Corporation, 1965)

9. For instance, see: Paul F. Lazarsfeld and Sam D. Sieber, Organizational Problems of Educational Research: An Exploratory Essay (New York: Bureau of Applied Social Research, Columbia University, 1962); Sam D. Sieber with Paul F. Lazarsfeld, The Organization of Educational Research in the United States (New York: Bureau of Applied Social Research, Columbia University, 1966), Cooperative Research Project No. 1974, ERIC ED 010 276.

10. For instance, see: Carnot E. Nelson, "The Communication Systems Surrounding Archival Journals in Educational Research," Educational

Researcher, Vol. 1, No. 9, 1972; Carnot E. Nelson and Carol V. W. Adams, "Continutiy of Research Effort and Sources of Scientific Information by Educational Researchers," Educational Researcher, Vol. 2, No. 6, June 1973; Carnot E. Nelson, "Communication Within the Educational R&D Community - Suggested Steps toward Further Structure and Order," Educational Researcher, Vol. 2, No. 4, April 1973; and Carnot E. Nelson, Scientific Communication in Educational Research: Final Report, ERIC ED 073 793.

11. See footnote 8 above.

12. For instance, Research for Better Schools has a network of schools which were involved in field tests of their Individually Prescribed Instruction program. Other networks include the network of Innovative Schools and the ES '70 Schools.

13. For instance, see Pellegrin, Analysis of Sources and Processes of Education, op. cit.

14. Ibid.

15. The best current source we have seen on this is: Center for New Schools, Assistance Strategies of Six Groups that Facilitate Educational Change at the School/Community Level (Chicago: Center for New Schools, 1977).

16. For instance, see: J. Lindeman, S. K. Bailey, J. S. Berke, and L. H. Naum, Some Aspects of Educational Research and Development in the United States - Report for the OECD Review (Syracuse: Syracuse University Research Corp., 1968); Baldridge and Burnham, The Adoption of Innovations: The Effect of Organizational Size, Differentiation, and Environment, op. cit.; J. Victor Baldridge, "Political and Structural Protection of Educational Innovations;" in What Do Research Findings Say About Getting Innovations into Schools: A Symposium, Sanford Temkin and Mary V. Brown, eds. (Philadelphia: Research for Better Schools, 1974); and Rittenhouse, Innovation Problems and Information Needs of Educational Practitioners) op. cit.

17. Virtually every research organization publishes a catalog (or listing of some kind) of its publications. This is true whether one is looking at some of the larger organizations such as the Rand Corporation, or the Institute for Social Research, the Bureau of Social Science Research, or Stanford Research Institute, or the regional educational laboratories or R&D centers, or even some of the smaller, newer organizations such as the Center for New Schools. As an example of a catalog of outputs from a group of institutions, one might examine the CEDaR catalog: Council for Educational Development and Research, CEDaR Catalog of Selected Educational Research and Development Programs and Products (Denver: CEDaR, 1972).

18. NIE, Building Capacity for Renewal and Reform, op. cit.; NIE, Concept Paper for the School Practice and Service Division, op. cit.

19. National Institute of Education, Catalog of NIE Education Products (Washington: NIE, 1976).

20. For instance, see: Office of Education, Office of Program Planning and Evaluation, Annual Evaluation Report on Education Programs, FY 1971 (Washington: OE, 1972), ERIC ED 065 738; National Institute of Education, The Status of Education Research and Development in the United States: 1976 Databook (Washington: NIE, 1976); National Institute of Education, Request for Proposals for Evaluation of the State Capacity Building Program in Dissemination Washington: NIE, 1976), especially see descriptions of what each state is doing along these lines included in the RFP.

21. Douglas Hall and Susan Alford, Evaluation of the National Diffusion Network: Evolution of the Network and Overview of the Research Literature on Diffusion of Educational Innovations (Menlo Park: Stanford Research Institute, 1976); John A. Emrick, with Susan M. Peterson and Rekha Agarwala-Rogers, Evaluation of the National Diffusion Network, Vol. 1: Findings and Recommendations (Menlo Park: Stanford Research Institute, 1977).

22. NIE, Concept Paper for the School Practice and Service Division, op. cit.

23. Ronald Lippit, "The Use of Social Research to Improve Social Practice," American Journal of Orthopsychiatry, Vol. 35, July 1965, reprinted in The Oregon Studies, Vol. II, op. cit.; Paul D. Hood, "Dissemination, Distribution, and Utilization of the Laboratory Products," in Oregon Studies, Vol. II, op. cit.

24. For instance, see: Lippit, "The Use of Social Research to Improve Social Practice," op. cit., Margaret Nelson and Sam D. Sieber, Innovations in Urban Secondary Schools (New York: Bureau of Applied Social Research, Columbia University, 1975).

25. For instance, see: NIE, Concept Paper for the School Practice and Service Division, op. cit.; NIE, RFP to Establish an "R&D Dissemination and Feedforward System", op. cit.

26. NIE, Concept Paper for the School Practice and Service Division, op. cit.

27. Ibid.

28. For instance, see: Neal Gross, Joseph B. Giaequinta and Marilyn Bernstein, Implementing Organizational Innovations: A Sociological Analysis of Planned Educational Change (New York: Basic Books, 1971); and L. M. Smith and P. M. Keith, Anatomy of Educational Innovation (New York: Wiley, 1971).

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42. For instnace, see the following chapters in this volume: "Environmental Influences on the Educational R/D&I System," "The Development Function in Educational R/D&I," "Dissemination of Educational R/D&I Outputs," "The Implementation and Utilization Functions in Educational R/D&I," "The Evaluation Research Function in Educational R/D&I," and "Outputs of Educational Research and R/D&I."

43. Radnor, Spivak, and Hofler, <u>Research, Development and Innovation: Contextual Analysis</u>, <u>op. cit</u>., Chapter 9, "Entrepreneurship: An Issue of the Historical Development Feature."

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45. Ronald G. Corwin, "Strategies for Organizational Innovation: An Emprical Comparison," <u>American Sociological Review</u>, Vol. 37, August 1972.

46. Sieber, "Organizational Influences on Innovative Roles," op. cit.; and Sarason, The Culture of the School, op. cit.

47. For more on this, especially our reasons for questioning the utility of much of the diffusion research literature for application to the educational context, see our subsequent chapter in this volume entitled, "The Implementation and Utilization Functions in Educational R/D&I."

48. A planned NIE survey of school practices is mentioned in National Institute of Education, Dissemination and Resources Group, Dissemination and Resources Group Program Plan FY 1978 (Washington: NIE, August 1976).

49. Such in-depth documentation with cross-case analyses might follow the pattern used by The Oregon Studies on Research, Development, Diffusion and Evaluation, op. cit., H. Del Schalock, Director. See especially Vol. 4, Parts 1-3, Case Profiles, Harry L. Ammerman, Darrell Clukey, and Gregory P. Thomas, ed.; Vol. 5, Methodology, Loring M. Carl, Gregory P. Thomas, Clark A. Smith, Kevin R. Morse, and Darrell Clukey, eds.; and Vol. 1, Summary Report, by H. Del Schalock, Gregory P. Thomas, Kevin R. Morse, Clark A. Smith, and Harry L. Ammerman. For a less successful effort at the same kind of case studies with cross-case analyses, see materials produced in 1978 in the Documentation and Technical Assistance in Urban Schools Project, sponsored by NIE's School Capacity for Local Problem-Solving Group.

50. See our earlier chapter entitled "Need Identification in Education."

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EDUCATIONAL RESEARCH, DEVELOPMENT,

AND INNOVATION: THE INSTITUTIONALIZATION

OF CHANGE IN EDUCATION

CHAPTER FOURTEEN

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THE IMPLEMENTATION AND UTILIZATION FUNCTIONS

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Page

Of all the educational R/D&I functions, implementation is the most recent to have been discovered by federal policymakers as an area in need of support. Interest in implementation has been sparked by the repeated finding of no significant effect from much of the innovation that has been tried in the past decade or so, and by the nagging questions that have been raised about what this finding means in relation to what has in fact been implemented: Has the innovation been tried and failed, or was it in fact never tried at all, and therefore never really given an adequate test?[1] What in fact is the precise nature of the innovation that was implemented, and how closely does it resemble the innovation as its developers intended it to be implemented?, To what extent is the limited effectiveness of an innovation as implemented attributable to problems encountered in the implementation process and to needed implementation support that was not provided? Under what implementation conditions is a given innovation most effective? Under what conditions is it least effective? Federally funded evaluations of innovations are increasingly calling for data on the implementation process (i.e., documentation of what in fact was implemented and how), so that findings on program effectiveness can be meaningfully related to information about what it was that was implemented, and to what "treatment" (to use the research jargon) the effectiveness data are relevant.[2]

This new federal interest in the implementation process seems to have emerged at about the same time as another interesting shift, this one in the thinking of the educational R/D&I community at large. Though such characterizations are risky -- there being no clearly defined "R/D&I community," much less any consensus on what represents current educational R/D&I thinking -- our reading of the literature, professional discussions and debates, etc. over the past four to five years suggests that the focus of new thinking on school improvement has shifted from external R&D to internal strategies.

One early indicator of this shift may have been the increasing nuvber of attacke made on the naivete of the linear R&D model. This model (at least as it has been characterized in the literature) assumed that research and development work could be carried on largely in external R&D organizations, which would develop and package innovations, which could then be disseminated to user systems, adopted by them, and there implemented and used by them as developed and packaged by these R&D organizations located outside the operating system. Although few now appear to acknowledge that they ever subscribed to this linear model, it appears that federal R&D funding was allocated in a manner that assumed this model as the basis for a viable innovation strategy.

Recent literature suggests that the educational R/D&I community may be evolving a more sophisticated grasp of the complexity of educational innovation processes, and especially the complexity of the operating system, the large number of variables of consequence for the innovation process, the considerable variability among schools and school systems, and the substantial impact of the operating system and its variability on innovation processes.

The newer literature calls for design and support of innovation strategies that focus attention on the operating system. The key emphases in that literature are on: "adaptation" rather than "adoption" of externally developed innovations;[3] innovation processes that go on wholly inside the operating system (e.g., local problem-solving approaches; OD and various other self-renewal strategies);[4] the need for technical assistance to support implementation and utilization of innovations, whether developed within the operating system or in external R&D organizations;[5] the need for a more sophisticated understanding of the practice setting;[6] and the need to expand the capacities of practitioners and school systems to carry out their own innovations (i.e., the need to support efforts to improve educational practice as a craft and evolve structures and processes in the practice setting to facilitate innovation and its institutionalization).[7]

Federal education policy appears to be reflecting (and perhaps even fueling) this new thinking in a turnabout in emphasis, the second turnabout in less than two decades. After over a decade of federal investment in educational R&D, with large sums going to both external R&D (e.g., the labs and centers and private sector R&D organizations) and internal practice-based development (e.g., E.S.E.A., E.S.A.A., and categorical funding to vocational education and programs for the handicapped), federal budget allocations indicate a mixed investment in both internal and external strategies. Many of the newer program initiatives, though, are directed at building internal school system capabilities. In sum, new policy and program development appears to have returned to where it was prior to the mid-'60s surge of faith in external R&D as the one best approach for achieving rapid improvement of educational practice. The focus appears to have returned to the operating system, and to the difficult and likely slow process of improvement of practice from inside the operating system, relying largely on practitioner expertise and resources, and on efforts to strengthen and expand those resources and areas of expertise.

Consequently, for our analysis, this chapter must do double duty, presenting both: (a) our examination of implementation/utilization processes and their requirements, and also (b) a more extensive analysis of the operating system than the overview presentation included in our earlier chapter on the environment of the educational R/D&I system.[8] Since operating system attributes critically affect implementation and utilization processes, it seems essential to examine these in some depth, to permit us to arrive at some judgments about the kinds of implementation/utilization supports that may be needed. Much of what we will discuss in this chapter in our analysis of the operating system is relevant not only to implementation and utilization, but also to the entire innovation process as it takes place within operating systems (i.e., need identification, research, development, dissemination, and evaluation research as they occur within practice settings, as well as implementation and utilization).[9]

Definitions: For purposes of this analysis, we are considering implementation together with utilization in a single chapter. Implementation is defined as all processes leading to installation and trial of an innovation in the user operation. The processes are very much the same regardless of whether they are undertaken at the initiative of the user, the producer, a distributor, or some support service. These processes include: installation, testing and debugging, monitoring and evaluation during the trial run, and feedback to the user and producer.[10]

Utilization is defined as the "processes resulting in the innovation being accepted by the user organization on a continued, sustained basis."[11] These processes include: routinization; standardization; institutionalization; monitoring, evaluation, modification and feedback prior to accrptance; acceptance; maintenance; and possibly extension and improvement.

We are considering these analytically separable functions together here for two reasons. First, although each has distinct components, the two share several processes in common. Second, in reality they seem most meaningful when considered together. Quite obviously, the utilization stage cannot be reached unless the implementation stage has been completed successfully, and many of the factors that affect the utilization process are conditioned by the experience with an innovation during the implementation stage. Less obvious, but of paramount importance, the implementation process has no real long-term significance for a given operationg system unless it is followed by institutionalization and maintenenance of the innovation during the utilization stage. The observation that there appears to be a considerable amount of experimentation with innovations in school systems yet very little real change may simply reflect the fact that the innovation process often ends at the implementation stage and rarely continues into successful routinization, institutionalization and maintenance of the change in the day-to-day operations of the school system. Therefore, considering both implementation and utilization together may underscore the needed linkage and long-term nature of the implementation/utilization process.

Chapter Overview: In this chapter, we will examine the literature on implementation and utilization of innovations in education, and also draw on some of our experience in the education sector and our understanding of implementation and utilization processes as they operate other sectors.

We will present, first, a brief overview of potentially relevant bodies of literature and the kinds of useful insights each might be expected to provide to guide policy development.

Second, we will take note of some of the difficulties we encountered in trying to understand and apply this literature to the operational reality of schools and classrooms. Some of the difficulties will be traced to the emergent nature of thinking on the subject. The cutting edge of much of the new literature disputes the adequacy of previous research for application to the educational context. The literature as a whole, then appears at first glance to be contradictory and confusing. But this is only a part of the difficulty, and probably the least important part. More troublesome is the disquieting sense we have that much of what is emphasized in the literature is misleading for understanding what strategies are likely to have the greatest effect facilitating school improvement. Our assessment of the literature ummarized in section two, then (which turns out to be the bulk of the potentially relevant literature) is that it may very well point policy thinking in the wrong directions.

In section three, we focus on some other factors suggested in a handful of studies which we believe point in more productive directions. In discussing these other factors, we will take note of some of the unanswered questions they raise and suggest what sorts of questions we believe need to be studied before we will be in a position to develop workable policy options and programs to strenthen implementation and utilization of educational innovations.

Finally, we will examine some recent initiatives that have been taken to strengthen implementation and utilization of innovations in education, and take note of some other possibilities that may warrant aconsideration. We will consider, too, how some of the unanswered questions in need of emphasis and research might be incorporated in current or future efforts to provide implementation/utilization supports.

I. OVERVIEW OF THE RELEVANT LITERATURE

There are at least four bodies of educational literature relevant to an understanding of implementation and utilization of innovations in education: (1) the literature on planned organizational change as described for an education audience; (2) the literature on schools as organizations; (3) analyses which pinpoint the implementation and/or utilization stage of the innovation process as the key stumbling block to successful change; and (4) descriptons of R&D utilization and self-renewal efforts by school systems (whether carried out with local internal resources or with the assistance of external sources of expertise). We will consider each of these briefly in turn.

1. The Literature on Planned Organizational Change

There is an enormous literature on planned organizational change, which has become a substantial, active, and growing field in its own right. Most of this literature has been produced over the past two decades, accompanying the proliferation of federally funded social reform interventions in the '60s and the increasing attention given to organizational behavior and organizational change by the field of business management. Planned change has been the focus of considerable attention by scholars from the disciplines of psychology, sociology, and political science, as well as applied fields such as education, social work, business management, and public administration. The subject has received intensive treatment by those who focus on organizational behavior and social psychology, and has also been approached from such diverse viewpoints as the human relations perspective on the one hand and the political systems perspective on the other.[12] There are already scores of classics in this literature.[13]

Review of this large body of literature is beyond the scope of this analysis. However, we have taken note of a number of secondary sources that have been prepared for educators in an attempt to make this knowledge base more accessible to them. This body of secondary sources includes several annotated bibliographies[14] and some useful review articles and knowledge syntheses.[15]

This literature provides analytical tools for determining what kinds of change strategies might be most useful in particular organizational contexts, as well as what barriers to change should be anticipated, and what kinds of implementation supports might be needed for the innovation process.

2. The Literature on Schools as Organizations

The field of sociology of education has undergone a considerable expansion over the last two decades, and with it has grown the literature on schools as organizations. Sociologists have examined the social structure of schools, the norms, values, and attitudes that condition the behavior of school personnel, the relationships between schools and their environments, etc. All of these tend to operate, more often than not, as barriers to change, i.e., as sources of difficulty that need to be overcome in the implementation and utilization phases of the innovation process.

There is a rich, fascinating literature about schools as organizations[16] that is absolutely "must" reading for those who are serious about producing planned change in schools. Clearly, unless organizational sources of resistance to innovation are taken into account, planned change will not succeed, regardless of whether the strategy taken involves external R&D or internal development or renewal. We will concern ourselves in this chapter with the kinds of research, policy, and planning issues raised by this literature, and the unanswered questions that need to be tackled.

3. Analyses Which Pinpoint Implementation/Utilization as the Stumbling Block in Change Efforts to Date

A smaller, but very informative literature has analyzed specific change efforts that were not highly successful, and located the key problems in the implementation/utilization process. This literature includes: case studies of specific change efforts;[17] analyses of the change process and its difficulties, using specific change efforts as springboards for the broader discussion;[18] surveys of innovations described by practitioners as "implemented";[19] and one exceptionally useful review of the literature on implementation, produced as part of the Rand Corporation's Change Agent Study for the Office of Education.[20]

The importance of this literature cannot be overstated. Several of these pieces are cited repeatedly in recent discussions of educational innovation, as support for the need to focus attention on implementation processes.[21] Federal policymakers in particular seem to have been impressed by the argument. Examination of some recent RFPs issued by both OE and NIE show clear indications of the impact of the argument: Evaluation reseatch contracts appear increasingly to be including requirements for documentation and analysis of implementation processes. Implementation data is coming to be called for from evaluators assessing new programs implemented by school systems. And innovative programs of various kinds are now being designed to include grants to third-party researchers whose responsibilities focus on studying program processes.

We will examine this literature in some detail in a subsequent sectioh of this chapter, and use it as a basis for much of our analysis of needed research and useful directions for policy thinking.

4. The Literature on R&D Utilization and School System Renewal Efforts

In the last few years since federal policy has taken cognizance of the significance of the implementation and utilization stages of the innovation process, various kinds of implementation/utilization supports have either appeared or increased their prominence on the education scene. The literature is still relatively sparse, but there is an accumulating body of material on the creation and functioning of: teacher centers;[22] training and technical assistance groups;[23] OD and renewal teams in special units within school systems;[24] state and interstate networks of intermediate school service agencies (IEAs and ISAs);[25] and networks of schools and districts linked to one another because they are dealing with similar problems or using similar innovations (e.g., the RBS network of schools using their Individually Prescribed Instruction Program, the Network of Innovative Schools, the ES'70 Schools, the National Diffusion Network, etc.[26]).

The implementation support strategies used by these organizations appear to lean more havily toward a clinical change model of working with clients to adapt innovations to local circumstances, as contrasted with the R&D delivery model of assisting school districts in acquiring standardized products developed by R&D organizations. However, beyond this general orientation suggested by the literature, we know very little about the nature or scope of this institutional base; how many organizations there are, and of what various types; how they are distributed geographically and by services provided; how many school districts they serve; what strategies they use and with what degrees of effectiveness; what personnel and other resourc bases they draw on; the nature of their linkages with KP as well as KU, or with other linkage organizations; etc.

While there is nothing new about schools or districts experimenting with one or another particular innovation, what is new about these renewal efforts of the past few years is their emphasis on building school system capacities for ongoing, self-initiated, self-designed, and self-managed change. As a by-product of this emphasis, there is considerable interest in developing training programs for change agents and producing various guides and other materials to support change agents in their efforts. Consequently, there has been a proliferation of training programs and guides making their appearance in this literature.[27]

In a subsequent section of this chapter, we shall have more to say about these utilization and renewal efforts, and how they may be used to enable us to learn more about implementation and utilization processes and requirements in education and policy options to strengthen implementation and utilization of innovations in education.

II. UNDERSTANDING AND APPLYING THE LITERATURE TO POLICY DEVELOPMENT

Of all the topics we have analyzed in this volume, the material covered in this chapter is perhaps the most difficult to come to grips with in a policy relevant manner. There are at least three reasons for this.

First of all, although there is a sizeable literature that is potentially relevant to the subject, there is relatively little literature that specifically describes the implementation or utilization of innovations in education. And little of what does exist in the literature is highly useful. There is a literature which points to this phase of the innovation process as a key stumbling block, and we will look at this shortly. But even so, what we have learned from this literature is on a highly general level and lacke the specificity required to guide policy or program development. This literature simply raises more questions than it answers.

Second, the literature as a whole is difficult to apply because a key theme in much of it is that the bulk of the exisiting material on this subject is irrelevant to the educational context, and probably misleading for an understanding of implementation/utilization in this context. What we find in the newer literature is an effort toward reconceptualization, aimed at reorienting thinking in the field and building new theoretical frameworks. The sense one gets from this new literature is not only the inadequacy of old findings but also the irrelevance of the old questions that fueled earlier research.

Basically, the argument made in the newer literature is that the earlier work, carried out in the diffusion research tradition, failed to make a number of key distinctions critical to understanding implementation/utilization in the educational context. Most of the work was carried on in other contexts rather different in important ways from the field of education. When applied to education, then, it focuses attention on the wrong factors and overlooks the key forces at work in implementation/utilization in education. We shall explore these distinctions in some detail, assess their policy significance, and then take alook at the questions they raise about the utility of the earlier literature and about new kinds of research and analytical wark that may be needed.

There is then relatively little literature on the subject, and the most useful of what is there questions the relevance of the rest of the literature for application to the educational context. As important as these reasons may be in [illegible]ning why it is so difficult to apply the existing literature [illegible]olicy development, their significance dims in comparison to the third, most important and most unsettling point wemust come to terms eith. The topic of implementation/utilization processes forces us more closely perhaps than any other subject we consider in this volume to confront the school and classroom reality and to ask ourselves about the validity and relevance of many of the assumptions about (and descriptions of) schools and classrooms found in much of the literature. The more one thinks about the schools one has seen and the people one has known working in those schools, the more one gets the disquieting feeling that real schools and real people don't quite work the way they are described in the literature, that what is described in the literature may be at best only a small part of the whole (and not necessarily the most important part), and that the points emphasized in the literature are not the ones most helpful for understanding the real problems that need to be the focus of policy development.

For all these reasons, the literature we have tried to synthesize seems to point to more research issues than to clear policy options. It may simply be that our understanding of implementation/utilization processes in education is too immature to provide much guidance for policy development and that this must simply be accepted as the baseline for a longer-term policy research program.

An examination of that literature and some of the questions it raises in our minds may indicate some of the complexity that needs to be explored and some of the issues that should be pursued.

1. <u>Analytical Distinctions</u>

A. <u>Technological Innovations vs. "People Change" Innovations</u>

Most of the work done in the diffusion research tradition involved the study of technological innovations (e.g.: a new high-yield hybrid breed of corn). The technological type of innovation has a number of distinctive attributes that make it quite different from the kinds of innovations typical to educational settings. The innovations introduced are generally easily definable, boundable entities, with observable (often measurable) effects that can be replicated easily. The process of persuading a potential adopter to try a given innovation can generally make use of evidence showing the innovation as clearly better (in observable ways) than what it is to replace. The innovations are likly to challenge few if any of the potential adopter's values or attitudes. It is usually not particularly difficult to learn how to use the innovation. There is little if any reactiveness between the innovation and the user: the outcomes tend to be approximately the same regardless of where the innovation is implemented and by whom (so long as the pre-specified, generally easily-produced, implementation conditions are adhered to).

Although somewhat oversimplified, one might imagine the implementation of a technological innovation in terms of pushing a button and getting the prespecified results regardless of who pushes the button and where the innovation is installed. And too, though again oversimplified, one might anticipate finding the innovation installed in the new setting precisely as developed by its external developers, with little in the way of adaptation required.

The innovations typical of the field of education are a rather different sort. One anlyst coined the term "people change"[28] innovations, focusing on their most significant and most troublesome quality. Innovations like the "new math" or the "open classroom," for instance, require "people change" in two ways. Ultimately, they are intended to produce some changes, i.e., measurable effects, on children -- in the case of the "new math," increased understanding of mathematical concepts; in the case of the "open classroom," more individualized instruction, increased motivation, and higher levels of achievement. More immediately, these innovations require changes in the behaviors (and often the attitudes and values) of the practitioners who are an integral part of the innovation's delivery system. A teacher or school administrator who is accustomed to traditional mathematics instruction or the traditional self-contained classroom, must do a considerable amount of self-changing before he or she can effectively provide instruction in the "new math" or effectively use the "open classroom" approach. These innovations require practitioners to unlearn old ways of thinking and doing, and then learn and use what may be totally new ideas, techniques, or behaviors. How one relates to 30 or so children in an "open" classroom is likely to be rather different from how one would relate to these same children in a self-contained classroom. This kind of innovation is not easily boundable in the "bigger-than-a-breadbox" sense. The outcomes are not easily observable or measurable. And since the teacher and the particular school setting and climate are integral to, and critically affect the innovation's implementation, there are probably relatively few educational innovations that are truly "teacher-proof." There is a significant degree of reactiveness between the innovation and the user (both the child as end-user and the practitioner as the more immediate user). Consequently, results are not easily replicable.

A few points should underscore some of the complexity to be confronted in dealing with innovations of the "people change" variety.

First, unlike the hybrid corn example, in which researchers knew a great deal about the seeds, soil, etc., in education researchers know relatively little about the variables affecting the considerable amount of reactiveness to be expected between the innovation and its users. Due to all of these unknowns, and to the immature state of development of evaluation measurement technology, and to the often very long-term nature of educational outcomes, it is difficult to measure results and to produce convincing evidence that a particular innovation is more effective than the existing approach it is to replace. And for the same reasons, it is also difficult to provide clear feedback on intermediate outcomes to guide the implementation process.

Second, because of the high degree of reactiveness between the innovation and users, one is likely to find the innovation implemented somewhat differently wherever it is tried, with different kinds and degrees of adaptations. This not only increases the difficulty of replicating expected results. It also further complicates the problem of assessing the innovation's effectiveness since defining the "treatment" becomes a problem in itself. Where the innovation to be evaluated appears to be somewhat different in each setting where it is tried, it is difficult to know if the outcomes in a given setting are attributable to the original innovation as developed and diffused or to the implementation conditions and adaptations in the particular setting. It becomes ~~difficult, then~~ to use results from one school system in a predictive manner in another school system. Therefore, outcome data from one school system cannot be used, without considerable qualification, to try to persuade another school system to adopt a given innovation. Nor can such data be used without considerable qualification in planning for implementation in a new setting.

Finally, another key point about "people change" innovations is that they often challenge established attitudes and values and therefore are more likely than technological innovations to stimulate resistance, from practitioners and oftern from parents and community forces as well. The "open classroom" is a good example of a radical innovation which challenges traditional ssumptions about how students and teachers should relate to one another, what classrooms should look like physically and where children should be found in them, what should be taught, to whom, when, and how, etc. This further complicates implementation both because the innovation is more likely to be resisted or emasculated into "more of the same," and because there is greater room for misunderstanding and failing to adequately unlearn the old while also learning the new. Consequently, "people change" innovations tend to have considerably more extensive training requirements than technological innovations, and are far more likely to be distorted or implemented only symbolically or not at all as measured by changes in classroom practices.

Given all these differences between technological and "people change" innovations, one must conclude that the typical educational innovation presents far greater complexity than is entailed in the technological innovations studied by diffusion researchers. And since the most influential forces at work in the implementation of "people change" innovations are different from those examined in the diffusion research literature, there does seem to be good reason to question the utility of most of that literature for application to the educational context.

B. Individual Adopters vs. Organizational Adoption

The potential adopter of an innovation studied in the diffusion research tradition is typified by the example of the individual farmer deciding whether or not to adopt a new breed of corn or the individual doctor deciding whether or not to adopt a new medical practice. In each of these cases, the innovation adoption process involved only one individual considering whether or not to replace the old with the new. In each of these cases, too, the individual making the decision to adopt an innovation was the same individual who would be implementing it.

Therefore, it was reasonably likely that if the individual could be persuaded to adopt the innovation, one would find that innovation implemented in practice, at least on a trial basis. This being the case, numbers of innovations adopted could be considered a relatively good indicator of "amount of innovation" in a field. Of course, there would be some slippage, with some individuals changing their minds or dropping out during the implementation stage or never even trying to implement it. But still, as a rough indicator, this seemed perfectly reasonable since the motivation for adoption and implementation were likely to be the same and the forces affecting the one were not likely to be very different from the forces affecting the other.

The individual might encounter technical difficulties during implementation, but was not as likely to encounter motivational difficulties as would be the case in organizational adoption.

One additional point about individual adoption decisions. In the case of adoption decisions made by individuals, the analysis of social interaction seems reasonable as a way to look at the diffusion of innovations. Who is influenced by what or whom, the role of gatekeepers in opinion influence, etc. -- all of these research issues come to be of paramount importance for understanding how to facilitate and speed the diffusion process. In the case of organizational adoption decisions, however, considerably more complexity is likely to be involved: the social interaction model may have no relevance at all or it may at best explain only a single step in a more complicated multi-step process affected by a much larger number of forces.

Adoption decisions made by school systems (or other large formal organizations) differ from adoption decisions made by individuals in at least two important respects.

First, organizational decision making is generally more complex than individual decision making. There are likely to be many more steps in the organizational decision process, and generally different people are involved at each step. And, compared to adoption decisions by individuals, the decision outcome is likely to be more affected by factors other than the merits of the innovation itself or the severity of the problem it might remedy. Particularly important as a decision clears one and then another point in the decision making process may be internal organizational requirements or organizational politics -- e.g., the needs of individual units in the organization, relations among levels in the hierarchy and units in the organization, and especially who in the organization is promoting the innovation and whose careers might be positively or negatively affected by its implementation. Another factor of some consequence may be the organization's external boundary relations, i.e., community pressures for or against innovation in general or a particular type of innovation.

In addition to the greater complexity of the decision process in organizational settings, there is a second important distinction between individual and organizational adoption decisions, with significant implications for the implementation process. In the case of the individual farmer or doctor studied by diffusion researchers, the individual making the decision to adopt an innovation was the same individual who would be implementing it, governed by the same forces and motivations. In the organizational setting, however, it is most likely that adoption decisions are made by one part of the organization (its key decision makers) and implementation responsibilities are carried out by another part of the organization (the operational staff). Because in the organizational setting those who make the adoption decisions are not the same people as those who must implement it, and because the decision to adopt may have had relatively little to do with the attributes of the innovation itself or the seriousness of the problem it is expected to remedy, the implementation stage of the innovation process is, in a sense, the adoption stage all over again, with individual implementers determining to a significant degree whether or not to use the innovation, and if so, how to use it (i.e., in what form, with what modifications, additions, or deletions, and under what conditions).

Whereas in the individual adopter case the same motivational and other forces generally affected both adoption and implementation decisions, in the case of the organizational adopter, totally different forces may be at work in each of these stages. In education, as described by one analyst, adoption decisions are affected by the market forces (or more correctly, the lack of market pressures) in the school context; implementation decision, however, are affected by a totally different set of forces set in motion by the bureaucratic structure of schools and school systems.[29] We shall elaborate this below in subsequent sections of this chapter. The relevance of this point here is to take note of the fact that it is a distinction that has implications only in the case of organizational decision making and not in the case of adoption and implementation decisions made by individuals.

All of these factors make the process of innovation adoption and implementation considerably more complex in organizational settings, and they suggest the inadequacy of trying to understand or facilitate that process by applying diffusion models (such as the social interaction model) from simpler individual-adopter contexts.

C. Adoption vs. Implementation

One of the most serious problems resulting from application of the diffusion research tradition was the failure of research in this mold to distinguish explicitly between the adoption of innovations by decision makers and their subsequent implementation by operational personnel. As discussed above, diffusion researchers generally studied the individual-adopter case and therefore the distinction had no significance. However, when applied to organizational contexts like education, where organizational factors significantly affect decisions and where decision making is generally a function separate and apart from operations, the failure to take this distinction into account produced results that were often misleading.

For instance, taking their cue from diffusion research findings, it seemed reasonable for researchers to assume that: (a) key decision makers in school systems and in individual schools determined how much innovation would take place in their classrooms, and that therefore (b) the amount of innovation in schools could be assessed in terms of the numbers of innovations adopted by school system decision makers. On the basis of such research methods as surveys of school superintendents or principals, producing self-reports of the innovations adopted by their schools for use in classrooms,[30] one might conclude that there was a substantial amount of innovation going on in school systems across the country.[31]

However, based on other methods, particularly observation of classrooms where school decision makers reported that various innovations were being used, rather different results were obtained. In one particularly important study entitled "Behind the Classroom Door," researchers found that few if any of these innovations could be found in practice, that in fact during implementation the "new" became almost unrecognizable from the "old," and little real change could be detected.[32] In several other studies, researchers explored why and how innovations were emasculated into "more of the same" old thing teachers had been doing before.[33]

In subsequent sections of this chapter we shall consider this literature in some detail, and especially the various motivational and technical factors uncovered in these studies to explain why and how adopted innovations are so often not implemented in any meaningful way. What must be underscored here is the significance of the previously overlooked distinction between the adoption and implementation stages, a distinction which is currently receiving a good deal of attention. Only when this distinction is recognized can one make sense out of what otherwise appears to be inconsistent findings from research pointing to both: (a) a substantial amount of innovation as measured by adoption decisions, and (b) relatively little innovation as measured by implementation. By focusing their attention on the adoption stage, and essentially ending their analyses at the point of adoption, diffusion researchers developed paradigms that were inadequate for taking into account what happened to innovations during implementation in settings like schools. The earlier analyses failed to give adequate weight to the fact that adoption and implementation were two totally different stages of the innovation process, carried out by different people, driven by different motivating forces, facing different kinds of obstacles, entailing different sorts of tasks and activities. And most important of all, different forces affected the outcomes of each. Clearly, then, the distinction is an important one for understanding innovation in the educational context.

D. Adoption vs. Adaptation

The literature on the R&D mode of improving education gives no hint of the fact that school systems might substantially adapt and change the outputs produced by specialized development organizations external to school systems.[34] The sense one gets from this literature is that development specialists would develop packages of programs and/or materials, which would then be adopted by school systems, who would then install and use the programs and materials as developed. Given the emphasis the R&D model placed on obtaining prespecified, replicable results, this constancy of the developed package seemed essential.

However, once attention came to be focused on implementation and utilization within school systems -- both by R&D specialists external to school systems and by advocates of other, internal approaches to school system self-improvement -- the naivete of this earlier thinking became apparent. It became increasingly clear that: (a) there were few if any innovations in the education context that could ever be truly "teacher-proof;" (b) that there was an inevitable degree of reactiveness between innovation and user (both the teacher as immediate user and the student as end user); (c) that the teacher (and/or administrator) was an integral part of the delivery system of most educational innovations; (d) that no matter what developers tried to do to affect the implementation process a certain amount of local adaptation was inevitable; and (e) that a certain amount of mutual adaptation between an innovation and the adopting school system was not only inevitable but even desirable, for otherwise it was not likely that the innovation would have genuine impact on the school system.[35]

Once the distinction between adoption and adaptation is recognized, along with the virtual inevitability of adaptation in the educational context, it becomes necessary to consider the incredible complexity applying the external R&D mode under these conditions. What is the nature of the development process when the program or package produced is going to be adapted and used in unknown ways? What is the end point of the external developer's role in this process? Is it earlier than in the external R&D mode as this is generally conceived and carried out to date? For instance, does it mean a short-circuiting of much of the revising, testing, and revising in "successive approximations" to prespecified outcomes which is the essence of the R&D mode? Or does it mean that the end point of the developer's role must comelater, with the developer integrally involved in the adaptation/implementation process? Or might there be some combination of both short-circuiting the cyclical pre-testing and yet also getting heavily involved in the adaptation process? What kinds of involvement might developers have in this adaptation process, and what kinds of staffing and organizational arrangements might be required? What kinds of staffing, organizational arrangements, and other supports might be created within school systems to facilitate this adaptation process? What sorts of specialized intermediary organizations might assist in the adaptation process and how might they be linked to developers and to users?

What is the entry point of the teacher/user in this process? Is it earlier than has generally been the case in the external R&D mode, perhaps at even the idea conception stage or at least throughout the design process? Or does the practitioner enter the process when a package developed to some degree or other is available for adaptation and use?

In evaluating the outcomes of a given innovation adapted and used in a large variety of ways, how does one define and measure the "treatment" in a way that is meaningful and useful across sites? Is that even possible? And even if possible, is it desirable? And under such widely varying adaptation and implementation conditions, what research approaches will be required to adequately measure "effects"? This becomes a matter of some difficulty when adaptation is to occur, since the researcher must attempt to assess both (a) those effects that are anticipated by the innovation's developers, and (b) others that are unanticipated and therefore unknown yet may turn out to be more important than those the original developers hoped to achieve.

These questions are a mere sampling of the array of questions that arise when one begins to think about the needed reconceptualization of the R&D mode once substantial mutual adaptation is taken as a "given." We now seem to be at the point of having recognized some of these problems. However, we are not yet at the point of having arrived at satisfactory answers.

The adaptation concept has been explored most fully in the Rand Change Agent Study.[36] The Rand team analyzed implementation in terms of the "interplay" between an innovation and the institutional setting where it is installed and used. The interplay, where it exists, consists of adaptation of the innovation to the institution, or the institution to the innovation, or both. Where there is no interplay, the Rand team suggests, there is no real implementation.

As shown graphically below, the Rand team described four implementation patterns uncovered in their research. The patterns differ in the degree of institutional adaptation and project adaptation during implementation.

Institutional Adaption

High

Project Adaptation Low	Technological Learning	Mutual Adaptation	Project Adaptation High
	←	→	
	Non-Implementation	Cooptation	

Institutional Adaptation

Low

The term "technological learning" is used to describe what generally happens in the case of technological innovations, and what was expected to happen when the external R&D mode was thought of in terms of producing "teacher proof" programs and materials. Those who are using the innovation adapt to it, but the innovation itself remains standard. Regardless of variations in the settings where it is implemented, the innovation remains unchanged from what it looked like when it left the hands of the designers who developed and tested it.

In the case of "non-implementation," there is little if any adaptation discernable in either the innovation or the setting. The innovation has been emasculated into "more of the same old thing," implemented only symbolically, with little observable difference between the "new" and the "old" that it was supposed to replace.

The term "cooptation" is used to describe the one-sided adaptation situation where the project is fitted and adapted to the setting, without any change in the practices or behaviors of those implementing it.

In the case of "mutual adaptation," the project and setting adapt to each other. The advantages of the mutual adaptation mode are underscored particularly well by the Rand team's discussion of what goes wrong in the other patterns.

> Central planners often assume that innovation is characterized by the first implementation pattern, technological learning. They assume that people can learn to use new machinery. But this analogy is deceptive. The type of individual learning that occurs in the machine situation primarily requires the mastery of new cognitive skills and activities; most importantly, such learning is a routine and legitimate extension of the job. In contrast, significant educational change requires new role relationships and new ways of seeing oneself in relationship to others and to the job. Internalizing these new relationships is not simply a routine extension of the teaching job. Nor do individual teachers always believe that these required changes are legitimate. In short, they need to be "motivated" to change their traditional behavior.
>
> It is convenient to think of three motivations or reasons why teachers might be willing to change. First, they might be complying with an order. Yet our anlaysis of the Change Agent innovations suggests that when people simply "comply," they generally do so in a pro form or symbolic way that results in non-implementation.
>
> Second, teachers might be willing to change their traditional behavior if such behavior is in their own self-interest, narrowly defined. That is, they might be willing to follow a plan if they received incentives for doing so. Yet our analysis indicates that such incentives as career advancement or extra pay were either ineffective or, in the absence of other motivations, led teachers and administrators

to coopt the proposed change to fit their traditional behavior.

Only the third type of motivation, belief in the value of the new practice, seemed to be effective in enabling people to devote themselves to the usually painful process of change. This belief in the value of the new practice often required that project people develop a sense of "ownership" about the proposed change and that they participate in planning and everyday decisions about implementation. ...they could do so by adapting the original project plans to their own needs as they simultaneously adapted their behavior.

In sum, whether or not mutual adaption was an "efficient" process, it was characteristic of the implementation of projects that did, in reality, result in significant change in teacher behavior.[37]

This "ownership" through mutual adaptation may be the needed answer to the all-too-familiar "not invented here" syndrome commonly found in educational settings. If practitioners are able to adapt externally developed outputs into programs or products that they accept as "their own," some of the significant barriers to acceptance of externally developed outputs may be overcome along with some of the technical problems encountered in trying to implement approaches developed by others and described in their own (rather than the practitioner's own) terms.

If one accepts this position, then it opens up a new research area and a large number of important questions on which the diffusion research tradition sheds little if any light. The Rand study underscored the complexity of the implementation process, and suggested how little is known at this time about the interactions that define the mutual adaptation pattern -- which factors and which interactions are most significant, what outcomes are most likely, and how this mode can be facilitated.

Of particular importance, the Rand study and the adaptation emphasis suggest a need to focus a considerable amount of attention on the institutional setting (and facilitating its adaptiveness and receptivity to change) and implementation processes. Throughout the period of large scale federal involvement in educational improvement, most of the concern has been focused on (and most of the investment has been made in the innovations that were expected to radically transform the schools. Only within the last four to five years has federal educational innovation policy seemed to give cognizance to the significance of the institutional setting and the implementation process in determining the success of these innovations. One key finding of the Rand study was that the attributes of the innovations themselves were the least important factors in explaining why some programs succeeded and others failed. Of far greater significance were the receptivity of the institutional setting and the implementation strategies employed.

E. Implementation vs. Utilization/Institutionalization

As we noted earlier in this chapter, technically, the implementation stage of the innovation process is defined as including only the initial installation, testing and debugging of an innovation in a given setting. The longer-term acceptance and use of the innovation as "routine" is defined as the utilization phase of the innovation process.

While this distinction is generally acknowledged and is nothing new in the innovation literature, examination of what has happened to innovations over the long term suggests the need to underscore the distinction. For a variety of reasons, relatively few innovations are successfully institutionalized and maintained. Clearly, a part of the explanaction lies in failures during the implementation stage. But even if we restricted our attention to only those that were considered successfully implemented, we would find a surprisingly small number continuing in operation as established practice. Thus, relatively few of the innovations in which investments were made can be considered to have had any more than fleeting impact on school practice. Consequently, there seems to be good reason to question the wisdom of the initial investment in the first place.

What has been lacking, in part, is "downstream" thinking that takes requirements of the institutionalization phase into account throughout the process of innovation design, development, packaging, etc. One obvious, all-too-often overlooked factor affecting institutionalization and continuation in this age of tight education budgets is money. Innovations in education tend to be more costly than the practices they replace, and most school systems lack the funds. Federal funding policies have often entailed providing "seed money" for an initial three to five year period, using the availability of funds as an incentive for school systems to adopt and implement a costly innovation they would otherwise be unable to consider. However, after this "soft funding" ends, the school system is left with the choice of either eliminating the program or paying for its continuation out of its own general operating budget. Operating budgets these days have tended to be cut back so far that continuation is not a viable option. This problem is an especially serious one for school systems that have adopted radical innovations requiring a total revamping of school structures, administrative arrangements, and the like. The school system deciding that it lacks the internal funds to continue supporting the innovation must now bear on its own the heavy costs of returning to the old practices, approaches, or arrangements the innovation previously replaced. Experience or familiarity with such "soft funding" catastrophes makes school systems even more wary of radical and costly innovations than they might otherwise be.[38] "Downstream" thinking from the earliest point in the innovation's design and development might conceivably have scaled down or restructured the innovation in a way that might have avoided or at least minimized this problem. Such "downstream" thinking, however, has been atypical of educational R&D and innovation. It is only within the last few years that serious thought has been given to incorporating the requirements of the implementation phase in an innovation's packaging. Consideration of the requirements of the institutionalization/continuation phase seems to be even rarer.

Money may be one of the most serious constraints on the utilization/continuation phase that one becomes aware of when one examines the distinction between implementation and utilization. But clearly, it is not the only such factor. The two stages are affected by rather different forces. The implementation stage of innovation, for instance, is surrounded by an aura of novelty and excitement. It generally attracts the most creative and imaginative teachers who are oriented toward new possibilities and excited by new challenges. Implementation efforts generally receive a great deal of administrative and external support, not just in the form of additional funding, but also additional materials and an abundance of resource people to help in the implementation process. Also, innovations that are being experimented with are generally kept somewhat apart from the rest of what constitutes educational "practice" in a given classroom or school, and are thereby generally easier to cope with in bounded, compartmentalized fashion.

Few if any of these conditions hold when the implementation stage is over and long-term institutionalization and routinization are called for. The aura of novelty is gone. The excitement disappears. The approach must be taught to, and used by, a broader spectrum of teachers and administrators, including many who are likely to be less excited by the challenge of new approaches, less oriented toward changing what they do, and probably too less able to change effectively. Complicating the problem, all or at least most of the external support resources are likely to disappear after the implementation phase, and so the harder and more demanding job of institutionalizing an innovation across a school or school district (if that "expansion" kind of continuation is anticipated), and perhaps too affecting broad practice (and not just a compartmentalized segment of practice), must be carried out with fewer supports for the process.

The point need not be belabored further. If long-term impact is the goal (and presumably it is), we must learn considerably more than we know now about what affects standardization, routinization, institutionalization, and continuation. We must apply what we learn to planning for all stages of the innovation process (including design, elaboration, testing, refining, and packaging). And, most significant of all, needed utilization supports must be made available past the implementation phase, for as long as required to insure effective routinization and institutionalization of new approaches.

F. Summary: The Greater Complexity of Innovation in the Educational Context

Each and every one of the analytical distinctions that we have considered here underscores how much more complex the innovation process is in the educational context than in most of the other contexts where innovation has been studied. Each new distinction we have noted has introduced greater and greater complexity and more and more unknowns. Much of the diffusion research literature then, may well be irrelevant, and even misleading for application to the educational context.

Reviewing some of this material, we begin with the distinction between technological innovations and people change innovations. While the case of technological innovations suggests the wisdom of focusing on the innovation itself and establishing its effects, the people change context requires a more complex approach, focusing on the interaction between the innovation and the institutional setting where it is to be implemented (especially the people who are to implement it and the people who are to be the end-users of the innovation, generally students). We need to do a considerable amount of new research to learn more about what factors in the institutional setting, what motivational forces (i.e., willingness to innovate), and what technical factors (i.e., ability to innovate) are most significant in affecting the implementation and use of different kinds of innovations. Policy thinking must be based on an understanding of not simply a given innovation's requirements, but also the requirements for effective innovation-implementation setting interactions--a considerably more complex body of understandings that needs to be developed.

The individual vs. organizational adoption distinction suggests the need to think beyond simple diffusion models that would orient the policy maker toward developing networks, locating gatekeepers, and refining persuasion techniques likely to influence these gatekeepers. An understanding of the organizational context of adoption decisions in sectors such as education requires going beyond this approach to also identifying internal and external forces that make organizations more or less receptive to various kinds of innovations. This introduces a whole new area of unknowns, and calls for more research analyzing organizational politics and organization-environment relations. We will need to know considerably more than we do now about these organizational factors before we will be in a position to develop more effective strategies for promoting organizational adoption of given types of innovations.

The adoption-implementation distinction focuses attention on all the unknowns that enter the innovation process after organizational decisionmakers have supposedly "adopted" a particular innovation. What sorts of changes must occur if a given innovation is to be implemented effectively? What sorts of motivational and technical barriers will have to be overcome if these changes are to be made? What supports are needed to help implementation personnel to overcome these motivational and technical barriers? While the "adoption" perspective focuses attention on the need to increase the number of innovation adoptions by decisonmakers (and therefore the need to strengthen diffusion networks and information flows to school districts), the "implementation" emphasis orients the policy maker toward implementation supports needed to increase the likelihood that adopted innovations will in fact be implemented, and will be implemented effectively.

The adoption-adaptation distinction introduces what is probably the largest area of unknowns. What sorts of mutual adaptations are likely for a given innovation? What sorts of development processes are called for when adaptation is taken as a given? What is the end point of the developers' role? What is the entry point of the teacher/user in this process? In what ways should the developer be involved in the adaptation? What supports are needed to strengthen the adaptation process in the operatonal setting? How (if at all) can one evaluate the effectiveness of an innovation across sites if it is adapted differently in different settings? Policy thinking from an "adoption" perspective focuses attention on developing innovation packages in a way that is most likely to encourage and facilitate adoption. The "adaptation" emphasis, however, shifts attention to changing the nature of "packaging" (to take into account the inevitability of adptation), thereby changing the nature of R&D; and allocating needed resources to the school setting where the adaptations are going to be made.

Finally, the implementation-utilization distinction focuses attention on the additional unknowns that enter the innovation process after the implementation phase. While the "implementation" emphasis suggests that policy needs to be developed to provide supports for implementation processes, the "utilization" orientation underscores the additional requirements we must come to understand to support long-term utilization. That will require learning how to overcome the financial, organization, and other barriers to continuation and institutionalizaton of innovations that have been implemented successfully. Before we will be in a position to do this, we will need to develop considerably more understanding than we have now about educational practice and the practice setting. Only when we have accumulated a strong knowledge base on the practice setting will we be able to effectively minimize the problems posed by institutionalization of innovations and understand how to develop and implement innovations for ultimate incorporation.

The history of much of the educational innovation attempted in the 1960s suggests the validity of some of the criticism that practitioners have levelled at the reformers -- especially that many reformers were somewhat ignorant of the institution and the institutional culture they tried to change, that they were relatively naive about how simply change could be brought about, and that they were all too easily stymied and overwhelmed by the complexities of the system's operational reality once they made the attempt to get involved and to try to implement their pet proposals for fundamental system reform. Perhaps with a more complex understanding of that reality, and greater skill in designing and implementing policies that take that complexity into account, there may be stronger chances for educational improvement some time in the future.

2. The Educational Setting

Clearly, given the key role of the institutional setting and its receptiveness to innovation in explaining implementation outcomes, it is critical for analysts and policymakers concerned with this subject to have a very good understanidng of the school setting, its culture, the barriers to innovation, and the opportunities that are there to be capitalized on to facilitate innovation. This, then, seems to be a good point to digress and take a detailed look at that setting.

Before beginning, however, we should point out that we have had some problems trying to reconcile our understanding of the literature with our sense of the operational reality of classrooms, schools, and school systems. Our difficulties revolve around two orientations -- perhaps, one might even say, "biases" -- in the literature.

First, there is the orientation in the literature toward radical rather than incremental change -- this, despite the fact that the overwhelming majority of instances of schools adopting something new to bring about one or another kind of improvement are examples of incremental change. The focus on radical change may be too simplistic for the educational context, and we may need to think about the broader range of change forms in designing policies to facilitate improvement in this rather complex context.

Second is the emphasis in the literature on barriers to change, supported by sociological analyses of schools as bureaucratic structures, relatively free of market forces, staffed by quasi-professionals whose solution to conflicting pressures is to resist innovation. The difficulty we have with this literature is not that we suspect its validity as descriptive material. Rather, we sense that, though it is fascinating material that needs to be absorbed and incorporated in policy thinking, the points have been too well made, and that the other side of the coin needs to be equally well described and understood. Most of the forces described in that literature affect all schools, and yet some of these schools are highly innovative and some are not. Therefore, we suspect that as a guide to policy development, this literature can be misleading -- suggesting policy investments in directions we believe to be relatively unnecessary, and failing to point toward the directions we believe more critical for policy development.

Let us explore these two issues more fully.

A. Radical vs. Incremental Change

The most basic question to be clarified before developing policy on educational innovation and change must be how we are defining "change." How novel or innovative must a given program or package (or whatever) be to the given school system? Must it require radical restructuring? Or will the simple addition of something not used before in that school or school system qualify as "change" under the definition used?

Most of the literature has been written by people whose primary interest and focus is on "change" and innovation." Though defined differently implicitly or explicitly in different pieces, the sense one gets is that what is of real interest is radical change, i.e., programs or policies that require radical rethinking of fundamental assumptions, restructuring of fundamental relationships among teachers, students, administrators, the community, etc., and/or using fundamentally new approaches to instruction.

Clearly, if one were to analyze all the programs, approaches, materials packages, etc. that have been adopted and used by school systems over the years, even over the past two to three change-oriented decades, the overwhelming majority would clearly fall into the incremental category.

There have, of course, been radical changes that have found their way into large numbers of school systems. Several examples come immediately to mind -- the "ungraded" classroom, "team teaching," the "new math," the "open classroom," and individualized instructional systems such as IPI (Individually Prescribed Instruction) or IGE (Individually Guided Education). But clearly, these examples represent a small segment of the total universe of "school improvements" one might want to understand as a basis for policy development for facilitating the improvement of educational practice.

The radical change cases are important and we need to understand how to facilitate this kind of change when it is called for. But they also need to be understood as <u>atypical</u> -- atypical in that they represent so few of all the changes that have been adopted, and atypical in how they came to be adopted. The implications for the implementation process are significant. Generally, these radical changes came into being either because they were imposed from outside or in "top down" fashion, or more often because the school leadership in a given area were excited by the new concepts or the new possibilities they seemed to represent. What is important is that the changes were not necessarily responses to needs or problems identified by those responsible for their implementation.

Much more typical may be the more incremental type of change that gets to be adopted as a result of school people searching around for new programs and/or materials, new teaching methods, etc. to meet felt needs or to solve identified problems. In some cases, this is a response to court mandates or legislation -- for instance, the need to mainstream handicapped youngsters into regular classrooms, or to establish bilingual programs in districts with large non-English-speaking populations. But in many other cases, it is simply the educator functioning as a professional, searching for additional materials to use or better ways to do things. Most of the new materials or programs they find and adopt are of the incremental type. They tend not to require radical changes in school structure, procedures, or practices. They are accepted because the teacher or the principal or the superintendent or the school board is persuaded that they are called for, to meet a new need, or because they seem to be better than what is already in use to meet an old need.

The two appraoches to change -- the radical appraoch assumed in the literature and the incremental type more typical of the school reality -- reflect different assumptions about what, if anything, is wrong, and what kind of "new" something may be needed to remedy the situation. In the "innovation" or radical change focus, the basic assumptions are that: (a) the problems in schools are traceable to the fact that things are being done in schools in fundamentally wrong ways, and (b) significant improvement in schools will therefore require a radical restructuring of basic structures, relationships, assumptions, approaches, etc. -- the kind of radical change that challenges fundamental assumptions, runs counter to established practices, and entails <u>un</u>learning old techniques, behaviors, and patterns of thinking as well as learning the new. What is required, then, is a total revamping -- a throwing out of "the old" and a starting all over again with "the new." While few explicitly acknowledge this, there is a strong undercurrent in this literature that "change" means "better;" the old is suspect and the new is applauded.

School people tend to approach change with a great deal more caution, even skepticism. This attitude is not simply a reflection of sociological factors in schools that create barriers and resistance to change. It is, to a substantial degree, a reflection of the historical reality of change in the educational context. Faddishness has been common in education. Educators have been burned badly by one fad after another that has been hailed as the solution to one or another problem, only to fail, and often fail in worse and more costly ways than the program or practice it replaced.

This cautious, conservative approach to change is also in part traceable to the fact that school people generally analyze what is wrong, and what needs to be done to remedy it, in ways rather different from those oriented toward radical change. What many school professionals would say is probably something like the following: The programs, methods, and materials they are using now are working only partially, or working only for some students and not for others. What they are looking for are ways to expand their repertoire to find approaches or programs or materials that might enable them to achieve success with those students who are currently having difficulty and who don't seem to be helped adequately by what the schools are now providing for them. However, given the unfulfilled promises of past fads, they want to see convincing evidence before they adopt something new. They want to have a reasonable degree of confidence that what they try will have some success with the failing students, while also not having negative effects on students who are having success with what is currently in use. Or, if they are contemplating using one approach with one set of youngsters and another approach with another set (so as to match each method with the students to whom it is best suited), then they want some assurance that they will be given the resources required to make that possible (e.g., more aides or assistants).

Contrary to the radical change proponents who trace the problems to what the school and school professionals are doing, school people don't generally see themselves (e.g., their attitudes) or their institutional setting as the problem. They define the problem in neither motivational nor sociological terms. Rather, they see it as a technical problem -- i.e., how to find the right combination of methods and materials to reach students with xyz difficulties. And it has been our experience that even those educators who essentially blame "those kind of students" for their difficulties, or who sound as though they have written them off as hopeless, when offered a program or appraoch that suggests the possibility of success with those students they will generally be willing to give it a try.

When the problem is defined in these technical terms, the adoption of a new program or approach can be viewed as the solution to a particular problem, and trying the new becomes acceptable without being seen as a confirmation of the incompetence of the professional or the inadequacy of the school system that was using the old. Thus, defining the problem in technical terms is compatible with incremental rather than radical change.

What all of this suggests is that we may need to develop more complex ways of thinking about change if we are to design policy options that will work in real schools. It may be that we will need one kind of policy thinking when radical changes are at issue (perhaps here the "mutual adaptation" notion is useful), and a somewhat different kind of thinking when the more typical, incremental sorts of changes are under consideration ("absorption and use" may be more appropriate than "mutual adaptation" when incremental change is involved).

And perhaps, we may need to think, too, in terms of a third, intermediate case, involving changes of a generally incremental sort that may also challenge some assumptions held by school people but less fundamental ones than those inherent in the "open classroom" concept (e.g., the offering of bilingual education programs or mainstreaming handicapped students into regular classrooms)?

It may be that we have gotten ourselves into a definitional box. By defining innovation in the radical sense, "innovation" oriented analysts are able to conclude that there is relatively little innovation in schools, or that change occurs at a "glacial pace." When innovation is defined in the incremental sense, a rather different conclusion becomes possible. Does the focus on radical change, out of an interest in one or another change theory, function as a set of blinders that prevents us from adequately understanding the operational reality of the educational context, and therefore from thinking in terms that are useful for guiding us toward viable policy options that will work in real schools?

Although there are some difficulties with the "problem-solving" concept when applied to schools,[39] this orientation may provide a better conceptual focus than the "innovation" notion. The advantage is that it focuses on the seeking behavior of the professionals rather than on the attributes of the solution, and therefore eliminates concern about how radically different or "new" the adopted change may be.

B. Sociological Descriptions of Schools vs. Factors that Explain Differences Between Innovative and Non-Innovative Schools

There is a large literature that describes how the social structure, norms, values, etc. of public schools make these institutions somewhat resistant to innovation. One gets the sense from the literature that the barriers are so great that they can be overcome only by means of the strongest of leadership (a quality that seems from the literature to be in short supply among educational administrators).

Yet, clearly, there are many innovative schools and school districts across the country, and surely there must be more to the explanation than simply the qualities of their principals and/or superintendents. We do not mean to minimize the importance of this leadership factor, for we are totally persuaded that it may in fact be the single most important factor. Still, we believe the picture is more complex than that, and that the barriers to innovation described in the literature are nowhere near as powerful as the literature suggests.

Our assessment of the literature is that it is unduly biased toward the barriers to change. It fails to give adequate attention to other factors that open up possibilities for school improvement that might not become apparent if policy thinking is focused only on motivational obstacles to be overcome.

Let us now consider that literature and the ways schools are described. Then we can return to such questions as: What factors are most important in distinguishing innovative from non-innovative schools, whether the literature may be unduly biased, what possibilities and opportunities policymakers might capitalize on to facilitate school improvement.

a. The Educational Setting: Barriers to Change

One particularly useful review article distinguishes between two sets of factors in the educational setting, one set affecting the adoption of innovations and a second entirely different set of factors affecting their implementation.[40]

We shall use this scheme to summarize much of the literature we have been examining on the subject, considering first the market structure of the school and the way it affects innovation adoption decisions, then turning to the bureaucratic structure of the school and its effect on implementation processes.

i. The Market Structure of Public Schools: The School as a Domesticated Organization.

One of the distinctive attributes of public schools is the fact that they are not market-oriented. They are protected organizations with a virtual monopoly in a given locality on what is generally seen as providing an essential service. The degree of public protection they receive is suggested by their characterization as "domesticated" organizations. As described in the literature, a domesticated organizaton is one which is guaranteed clients and resources regardless of its performance. With few exceptions (e.g., children who attend private or parochial schools or who are permitted to transfer to other public schools in the area), all students living within a particular set of school district boundaries must attend the local public school. The student "client" of such an organization is not free to accept or reject the school's services and neither (except in rare cases) is the school free to accept or reject the student.

> The label of domesticated organization is used to indicate that this class of organization is protected and cared for in a fashion similar to that of a domesticated animal. They are not compelled to attend to all of the ordinary and usual needs of an organization. For example, they do not compete with other organizations for clients; in fact, a steady flow of clients is assured. There is no struggle for survival for this type of organization - existence is guaranteed. Though this type of organization does compete in a restricted area for funds, funds are not closely tied to quality of performance. These organizations are domesticated in the sense that they are protected by the society they serve. The society sees the protection of these domesticated organizations as necessary to the maintenance of the social system and creates laws over and above those applying to organized action in general to care for these organizations.[42]

This domestication generally acts against the innovation process. There is no need to improve performance (i.e., to find "better" ways of doing things), so as to be able to attract either clients or resources. Consequently, there is little felt need for change. Instead, one finds an orientation toward continuing in the familiar, comfortable patterns that have characterized the organization's functioning in undisturbed harmony with benevolent environmental forces.

ii. <u>The Market Structure of Public Schools: The School as a Highly Vulnerable Organization</u>

As incongruous as it may seem given the fact that the school's existence and continued operation are guaranteed by this protected status, the school is also a highly vulnerable organization, more open to (and subject to) social and political influence than virtually any other type of institution or organization in our society.

For a variety of reasons, we have considered elsewhere,[43] the school is subjected to a considerable amount of public scrutiny. It is a public service organization supported by public funds and administered and regulated by public agencies. The school affects virtually all subgroups of the population, whether as parents, as citizens and taxpayers, or as business people who require a labor pool sufficiently educated to carry out required tasks. Since the proportion of local funds spent on public education tends to be quite high, schools tend to be particularly salient to taxpayers. For those taxpayers who are also parents of school-age children, the level of concern about school functioning tends to be even higher, for American society has been characterized by tremendously high expectations for schooling.

The school's vulnerability is enhanced by the diffuseness of educational goals and the difficulties of measuring educational outcomes.[44] There is relatively little consensus on the ultimate objectives of schooling. There are a multiplicity of goal emphases to choose from[45] and considerable disagreement in our society about which objectives should be most emphasized. Educational goals are, by their nature, diffuse and highly open to value-laden judgments, misinterpretation, and controversy. Given the large number of often differing constituencies a given school district may serve, virtually any significant decision can trigger conflict and attack by one or another segment of the populace. And, too, compared to other fields, educational goals are generally harder to specify, less measurable, and harder to use as performance standards against which to judge system performance. Consequently, it is difficult for school authorities to make a strong case for the effects program x might have on students of types a, b, and c. And since schools provide only some of the educational influences on people's lives (and much research suggests that non-school factors are far more significant than school factors in affecting one's learning and life-chances[46] it is difficult to assess the effects of schooling and say with any certainty what the ultimate importance of any program or policy decision might be.

There are other factors that contribute to the organizational vulnerability of schools as well. Since the knowledge and technology base of thefield is weak, it is often difficult to provide strong evidence that one program or method is more effective than another. Another important point is that schools are highly variable in quality, making deficiencies (imagined or real) all the more apparent and subject to public debate.

Contributing to the vulnerability of the schoo is the educator's legitimacy problems in claiming specialized expertise and professional status (a point we shall return to later). Compared to scientists, engineers, doctors or lawyers, the specialized training needed to function as a teacher or school administrator does not seem particularly awesome. And, too, the public is more familiar with what the educator does. Therefore, particularly for the better educated parent, there is far less of a gap in relevant expertise between the general public and educators than between the public and professionals in fields with strong knowledge and technology bases.

We need not belabor the point further. Clearly, a host of factors make the school highly vulnerable to external pressures.

In sociological parlance, organizatonal vulnerability is defined as "the probability of being subjected to pressures that are incompatible with one's goals without the capacity to resist."[47] Where an organization is in perfect harmony with its environment, any pressures coming from the environment are compatible with the organization's goals (as defined by its professionals) and the organization has the resources needed to attain these goals. In the case of a vulnerable organization, we find instead that: (a) the organization is subjugated to its environment (in school systems, for instance, legal control is in the hands of lay boards); (b) there is often a significant discrepancy between the organization's goals and the demands stemming from its environment (thus, a school's staff might be pressured to adopt a program for political reasons they believe on professional grounds to be worthless); and (c) the organizaton's resources are inadequate for it to achieve its goals (e.g., the schools are expected to produce academic success for a wide range of students with differing needs but are not provided with resources adequate to meeting all those needs).[48]

The school's vulnerability has two kinds of effects on its adoption behavior. On the one hand, school people are likely to be cautious about adopting programs or policies that are likely to disturb any significant interest group in their environment. The are even likely to anticipate trouble and reject programs they think just might disturb some segment of the community, even in advance of any evidence of a negative public reaction. In effect, then organizational vulnerability creates resistance to change. On the other hand, organizational vulnerability increases the propensity toward faddishness in education. If a given innovation has been highly publicized and received ~~strong~~ community interest and even enthusiasm, school personnel are likely to be inclined toward adopting it, even in the absence of evaluation data supporting its effectiveness (or perhaps even despite evaluation data suggesting little is to be gained by replacing an established program with this new one).

~~iii~~. The Bureaucratic Structure of Public Schools

Some of the most fascinating material that has been written about schools applies what is understood about the strains inherent in all complex organizations, analyzes how these strains are manifested in the education context in particular, and describes what effects these have on the functioning of schools and school professionals.[49] Of particular relevance here are analyses that focus on the bureaucratic structure of the schools, the tension this creates between teachers' self images of being "professionals" and the bureaucratic reality which restricts their professional autonomy, and the negative effect this has in creating resistance to innovation.[50]

A profession is characterized by at least three attributes: (1) its members perform a service that is viewed by society as essential; (2) the tasks carried out by professionals are assumed to require a high level of technical competence; and (3) professionals are therefore generally given a substantial amount of autonomy in performing their functions.

Only the first of these is clearly true of the teaching profession. Their function is viewed by society as essentail. However, the competence of professional educators is frequently called into question, for all the reasons noted earlier -- because to the observing public the amount of specialized expertise required by teaching seems considerably less than that required by other professions; and because education is a value-laden area with diffuse goals, unclear technology, and significant measurement problems in assessing achievement of the ultimate goals educational institutions are expected to attain.

Even more to the point in weakening the professional status of teaching, the autonomy and professional discretion of the classroom teacher is severely limited. What subjects will be taught, in what ways, using what textbooks and instructional materials, in what sequence, and even at what times of the day -- all such matters are generally determined by others, by lay boards of education or by authorities at higher levels in the bureaucratic hierarchy.

Beyond that, the teacher's professional behavior in relating to students is somewhat limited and cast into highly structured patterns by rules and regulations elaborated by administrators with a view towar- efficient organizational functioning rather than a concern about the quality of the teacher-student relationship.

At least part of the problem is traceable to the nature of the school as a service organization and, beyond that, as a particular type of service organization that has been given domesticated status. Both create conditions which run counter to the teacher's exercising broad professional autonomy.

First, let us examine the implications of the school being a service organization. A service organization is defined as being one established to benefit the client group, which in this case would be the students, their parents, and the broader community which provides the schools with their support. The prior definition of the organization's goals in this way tends to limit the professional's autonomy and authority. In any service organization, professionals are in a difficult position legitimating their authority because their function is defined in terms of serving the interests of the client group. They must try to serve those interests while at the same time retaining their authority and not becoming subservient to the demands of the client group. In education, the situation is further complicated by the low prestige accorded teachers and school administrators and the fact that their professional competence is so readily called into question by laymen. While in other service fields such as medicine the doctor is assumed to have some specialized expertise that gives him authority to determine what to do to best serve his client's interests, in education professionals have to struggle for their autonomy to carry on their profession in ways they believe to be called for by their training and expertise.

Second, there are the further implications of the school being a domesticated organization. Because there is no choice in the matter of attending school, the student client of the institution may not be there voluntarily. Yet he is there, very much a part of the organization and its functioning and very much able to disrupt it from carrying out its tasks. Consequently, student control becomes a key organizational concern. At the same time, what can be considered acceptable procedures and mechanisms for controlling students is limited by the implications of the school being a service organization established to serve the interests of the student and his parents, and is limited further by the requirement for accountability to parents.

The bureaucratic response to the tension between the requirements for both control and accountability is the elaboration of rules and regulations and the keeping of detailed records about infractions of these rules and regulations. The organization thus protects itself from environmental pressures by providing justification for actions taken and decisions made.

However, the price paid is a further compromising of the ideal of professionalism. Whereas in other fields technical expertise is the basis of the professional's authority, the teacher is expected to use formal sanctions to control students; the basis of the teacher's authority is the potential for resort to these sanctions; and the focus on such sanctions must inevitably reduce the service orientation of teachers (i.e., teachers are less likely to view their students as clients who they are there to serve).

Furthermore, in other professions colleagial patterns of authority prevail -- doctors or lawyers, for instance, are accountable for their actions to each other and particularly to their professional associations, the AMA and the Bar. In education, however, teachers are accountable to administrators and to lay authorities for their use of disciplinary procedures, as well as for the competence with which they perform their functions in general. Thus, the bureaucratic nature of the school as an organization, and the elaborate procedures developed to protect the organization from environmental pressures, have the effect of undercutting the professionalism with which the teaching role can be performed.

The low prestige of education is a matter we allude to frequently throughout the analyses in this volume. For purposes of this discussion, we may consider this low prestige both a cause and a consequence of these factors we have been noting. Where the prestige of a particular group is low, it becomes easier to question their competence and to limit their autonomy in carrying out their roles. And, continuing the vicious circle, when the technical competence of members of a group is frequently called into question and their professional discretion and autonomy are repeatedly limited by decisions and actions taken by others, the effect is a further erosion of the level of prestige accorded them.

There are various other factors that contribute to the low prestige of the teaching profession and to teachers' consciousness of their position at the bottom rung of the professional prestige ladder. It is a field which, especially in early childhood and elementary education, is comprised mostly of women, many of whom have limited professional commitment to the field, entering and leaving it as this fits their other, often more primary, commitments to starting and raising their families. Most are recruited from the middle and lower middle classes. Compared to other professions, teacher recruits are more likely to come from the lower end of the academic ability range. And, most intensely felt of all, salary scales for teachers have tended to be substantially below that of other occupations that require as much training.

As a consequence of all these factors, teaching is categorized as a "quasi-profession." There is clearly a gap (in fact an "institiutionalized gap") between the reality of teaching in most school systems in this country and the professional aspirations of teachers. The most significant effect of the quasi-professionalism, as described in the literature, is "status insecurity," which can have important effects on organizational climate and innovation. If this status insecurity is as important a factor as seems to be suggested by the literature, then the following are some of the ways in which it can create resistance to innovation.

First, there is likely to be some resistance to programs and policies designed to improve teacher performance. Such programs come to be viewed as incursions into their professional domain, limiting their autonomy, and, even worse, as proof positive that their professional competence is judged to be inadequate an in need of upgrading.

Second, there is likely to be resistance to the use of external consultants, for bringing in outside "experts" is seen as a further sign that their own expertise is viewed as inadequate.

Third, for much the same reason, and because of sensitivity to the school's organizational vulnerability, innovations coming from laymen are likely to be fought against with particular vehemence.

Fourth, status insecurity produces excessive "ritualism" in teachers' behaviors: there is an overcompliance with means, even at the risk of doing serious damage to the achievement of ultimate ends. The education or well being of a particular child might be better served by deviating from a particular rule or norm, but, according to this analysis, the teacher is too insecure to risk it.

Fifth, where status insecurity is a significant force in a particular school, or among a particular group of teachers, one finds a fascinating lack of professional communication among the teaching staff of a school Faculty room discussions, for instance, seem to meticulously avoid the subjects of teaching or learning or individual students, for participation in such discussions might reveal the inadequacies of a teacher's knowledge or skills. There is little sharing of techniques or solutions, in part because this would place one or more teachers in a psoition of admitting that they could learn something from someone else. There is no discussion of classroom problems because the possibility of gaining assistance in the solution of a problem is not a strong enough incentive for the insecure teacher who must admit to having a problem.

Sixth, there is often resistance to merit plans and various other incentive programs to stimulate and reward excellence, especially where judgments of excellence are to be made by administrators. The argument is made that such systems undermine the collegial relationships. Yet many other professions and occupational groups seem to welcome such programs and function reasonably well under them.

Seventh, a considerable amount of energy that might be directed toward educational experimentation and improving student achievement is placed instead in activities oriented toward status enhancement (e.g., unionism).

And finally, one of the most significant effects of teachers' status insecurity may be the all-too-common "not invented here" syndrome -- i.e., the notion that each school (and perhaps each classroom) is so unique that programs or materials designed elsewhere cannot be used effectively to meet another school's (or classroom's) needs. The teaching culture envisions the teacher as a craftsman, and the good teacher as a creative one. Consequently, the ideal teachers carry with them in their heads is to be fresh and original, to design particular solutions to meet the particular needs of particular students at a particular time in a particular place. Using ideas or materials or techniques developed by other teachers (or, even worse, by outside "experts" in some university or R & D organization) is looked down upon as mere "imitation," reducing the creative teacher to a mere functionary, or (in the case of "teacher proof" materials) a mere "teaching machine." Given this frame of mind, it is no wonder that teachers devote so little time to scanning journals or attending conventions to learn about the latest new developments in their field -- quite a contrast to a secure field such as medicine where doctors pride themselves on keeping up-to-date in their journal reading and being aware of new practices, techniques, and findings.

iv. Other Barriers to Innovation in Schools

In addition to the market factors that generally work against the adoption of innovations and the bureaucratic structure of schools which tends to undermine the implementation of innovations, the literature describes several other barriers to innovation in schools. Though analytically distinct, some of these are closely related to, and intertwined with, factors already discussed above. Most of these are derived in one way or another from the way the field is organized -- the way the school is organized as a work place, the way education is organized as a profession, and the way school systems recruit and reward their personnel.

Teaching as a Lonely Profession -- Teaching has been described as a "lonely profession,"[51] referring to the fact that teachers spend most of their working day in classrooms with young children and have little if any contact with other adults during their work day.[52] Although a certain amount of stimulation and satisfaction may be derived from the teachers' interactions with their students, generally lacking is the intellectual kind of stimulation that could be expected if there was more communication with other adults.

Few schools are organized in ways that provide intellectual stimulation for the professional staff. As described in the literature,[53] there tend to be few if any professional exchanges, few if any professional problem-solving conferences. Even the supervision a teacher may be given by the principal or some other administrator tends to involve little more than a short period of observation followed by little if any feedback. Whatever few opportunities there might be for interchanges with specialists from outside the school tend to be regarded more often than not as threats or intrusions rather than opportunities for exciting exchanges. Teachers tend after a while to be overwhelmed by the boredom that results from the routinized nature of their day, the relative constancy of what they do year after year, and the drain of constantly giving at a high level without getting much intellectual stimulation back in return. Few schools are organized to provide this "return" for teachers. Their need for new ideas and intellectual growth is not met. The consequence is that since teaching is no longer exciting or interesting to them, they put less effort into making learning interesting and exciting for their students.

And life in classrooms becomes duller still, for both teacher and students. The outstanding teachers are those who are able to resist the psychological effects of routinization, who somehow keep their autonomy and focus on helping their students as individuals. The literature suggests, however, that these teachers are the exceptions rather than the rule.

The lack of communication among teachers, as a result of the way the school is organized, is reinforced by the strains of quasi-professionalism we have already considered. Because teachers feel insecure, they prefer not to talk about their work, and especially about difficulties they may be having. So, the talks with outside experts come to be seen as unwarranted intrusions to be endured. And faculty room discussion runs the gamut of topics, except for the conspicuous absence of discussion about students and teaching.

This lack of interaction with peers retards innovation -- because valuable ideas and information are not exchanged, because teachers do not mutually stimulate one another in ways that might generate new ideas and additional creativity, and because it means the absence of a valuable source of reinforcement and support for efforts to try new things.

The "psychological loneliness" and lack of professional interaction we have been considering is closely related to another factor we might describe as the pattern of "time utilization" that typifies the teacher's work week in most schools. The proportion of work time that teachers (or administrators) are able to devote to their advancement is typically miniscule or non-existent. The point seems particularly underscored by comparison to the time utilization patterns characteristic of reaching on the college level, where classroom time generally represents a small share of the professor's work week, and other non-teaching activities (research, journal reading, attending conferences, etc.) receive the dominant share of the time allocation.[54] Clearly, the purposes of universities are defined in terms that emphasize making contributions to knowledge, and this is not generally true on the K-12 level.

There may be much of value to be gained from thinking about the possible effects of these time utilization patterns on the teacher and the teaching that is provided at these two levels (as well as on the rate at which new knowledge is accumulated). It has been argued, as we shall see shortly, that organizing schools in ways that make the continuing upgrading and professional advancement of teachers a central principle of school functioning may be essentail to significant improvement in educational practice. It may also be that stimulating teachers to contribute to the accumulating knowledge base on practice may be a vital element in this professional advancement and upgrading. We shall return to these points later in our analysis.

<u>Lack of Collaborative Norms</u> -- Several analysts have also pointed to the lack of collaborative norms among teachers.[55] These norms are particularly important if self-renewal approaches such as OD are to take hold in a school. Typically, at least as described in the literature (and

some of our own experience and observations support this), teachers do not share their creative ideas, approaches, and materials. It is the exception rather than the rule to find a creative teacher enthusiastically describing to her colleagues a new approach she developed or sharing the materials she developed so that others could try to use it themselves. It is not even unusual to find teachers hiding away their imaginative gems in locked file cabinets.

This phenomenon is related no doubt to the notion teachers have of creativity, and their images of what they do as uniquely fashioned by their own personalities and their interactions with particular bodies of students in particular times and particular places. But clearly, other crafts have functioned, even thrived, while carrying out lively interchanges on techniques. We will have more to say about this later in our analysis.

Weakness of Information Flows and Incentives for Communicating Innovative Approaches -- We have discussed elsewhere in this volume some of the key weaknesses of information flows within and among school systems.[56] These weaknesses take on particular significance as a constraint on innovation in education. Fewer new ideas enter the practice setting to intellectually stimulate school professionals to keep the classroom an exciting environment for learning or to find solutions to perceived problems.

Part of the explanation for this lies in the fact that schools are not organized in ways that permit a great deal of interaction among colleagues on professional matters. But other sources of the difficulty lie in the fact that the field is not organized in ways that reward creativity, put a premium on the practitioner playing a significant role in the innovation process, or provide sufficient incentives for risk-taking to overcome the practitioner's inclination to be highly sensitive to negative reactions (and even the potential for negative reactions). Lacking are high visibility institutionalized mechanisms for practitioners to disseminate the innovative approaches they develop[57] or incentives to stimulate sharing and collaboration. Data from one study showed that as many as 75% of the teachers involved had thought of innovative ideas or approaches, but only half of these teachers had spoken to anyone else about them, and only 5% reported any action as a result.[58]

Teachers could, of course, spend their non-work time, in the evenings and on weekends, writing up their novel techniques for publication in various magazines targeted at other practitioners. But use of this kind of mechanism clearly places a tremendous burden on teachers, many of whom already devote a considerable amount of their time in evenings and on weekends preparing their lessons and grading papers. What would seem to be needed in addition are: (a) approaches to organizaing teachers' time that permit and encourage this kind of activity as part of their work week, and (b) incentives that reward teachers for the innovations they develop and package (or assist in packaging) for use by others.

<u>Relative Absence of Change Agents</u> -- Another factor cited to explain the limited amount of innovation in education is the realtive absence of change agents in the field.[59] Principals and superintendents are often described as educational <u>leaders</u>. But the literature on these administrators suggests that most of them get overwhelmed by the <u>administrative</u> aspects of their jobs and relatively few are able to exert strong leadership in identifying problem areas and directing resources toward overcoming these difficulties and improving school functioning. The significance of the leadership exerted by these administrators, though, should not be underestimated. Where innovation levels are high, data generally point to the principal and/or superintendent as the key factor accounting for successful innovation.

Much research literature points to the significant roles external change agents can play in stimulating and supporting innovation.[60] However, until recently there have not been many institutionalized change agent roles in the field of education, and where change has been attempted from outside the system the external change agents have often fared poorly, perceived as "outsiders" who do not adequately understand the system or its needs, who are foisting unwanted changes on schools merely to advance their pet proposals, and their own careers.

There is also a body of literature which suggests that larger school districts are more innovative.[61] One interpretation of this finding has been that larger school districts tend to have more resources to spend on specialized personnel (central curriculum offices or curriculum coordinators, for instance) who function to link the school system to external resources for innovation and who can function in change agent roles. There are other factors that suggest why larger districts might adopt more innovations -- for instance, more diversity in the student body and in the environment, producing more problems, and greater pressures for programs to solve these problems. Still, there seems some validity to the assumption that larger districts employ more resource personnel who can function as change agents. This certainly warrants some empirical investigation, for confimation of this proposition would suggest an important avenue to pursue to increase innovation.

However, there is another interesting and somewhat different finding in the literature that bears some investigation as well. One group of investigators have concluded that although larger, more complex districts do have higher innovation adoption rates, they have substantially lower innovation implementation rates.[62] This would suggest that greater complexity may bring greater external pressures to adopt innovations -- for the adoption of the innovations may be a visible enough force to relieve the pressures -- but either interest in the innovation dissipates with the act of adoption (once the external pressure is reduced) or these adopting school systems may simply be unable to cope with the problems their complexity brings to the effort to implement these innovations. This dilemma, too, would seem to warrant considerably more investigation.

Salary, Tenure, and Promotion From Within -- Other structural features of the field of education also function to retard innovation.

Salary Scales: Salary scales, for instance, are based on amounts of experience and formal training rather than on classroom performance or development of valuable new teaching techniques or success in disseminating new approaches to the rest of the field. Salary scales reward length of service, and there is reason to believe that the more years teachers spend in classrooms the more established their patterns of functioning become and the less willing (and perhaps able) they may be to change. Salary scales also reward educators for additional formal training (additional course work, advanced degrees, or in-service training). But our observations suggest that, for the most part, teacher training institutions are not heavily oriented toward communicating innovative approaches. But this mechanism does not appear to be used as much as it might be for this purpose.

Tenure: Whatever may be said on behalf of teacher tenure (and there has been some lively debate on this matter), teacher tenure does little to advance innovation and probably has some effect in minimizing the felt need for innovation. If teachers are secure in their jobs for as long as they want them, they need not search for innovative approaches to improving their performance.

Promotions: Another common feature of school system recruitment and promotion policies is the pattern of promotion from within. Teachers become assistant principals, assistant principals become principals, and principals become superintendents, often all within the same school district. A substantial amount of literature suggests that some of the most innovative administrators are those who have moved about from district to district and that innovation tends to be increased by hiring top leadership from outside the system, enabling a "fresh look" to be taken at how the district operates, what its problems may be, and how these may be attacked.[63] Still, the predominant pattern in school systems is still that of promotion from within.

All of these incentive structures, then, tend to work against high levels of innovation.

History of Innovations -- One other factor needs to be noted before we bring this part of our analysis to a close. The unhappy history of innovations tends itself to retard innovation. The field of education has been swept so often by fads which have proven to have little value that practitioners are wisely cautious about new innovations. To offset negative attitudes practitioners have about innovations, R&D people make exaggerated claims for the benefits of their products. Then, when these claims turn out to be exaggerated (or even downright false), this increases skepticism about innovations and makes practitioners even more resistant the next time an innovation is proposed.[64] This is a factor that simply cannot be ignored. It suggests the need for more responsible behavior by the advocates of a given innovation, and it points to an aspect of reality that must be planned for if innovations are to be adopted and implemented in schools.

b. <u>The Educational Setting: Change Despite the Barriers to Change</u>

We have devoted a considerable amount of space to the barriers to change described in the literature, for most of the literature is about these barriers. However, despite these barriers there are substantial numbers of highly innovative schools and school districts. What makes the innovative schools different from those described in the literature? Many of the factors we have considered are constants across all school systems -- certainly the domesticated nature of the school as an institution; its vulnerability to environmental influence; certainly (at least to some degree) the bureaucratic organization of schools as institutions and the manner in which this conflicts with desires for professionalism; certainly the weakness of information flows; and the inappropriateness of salary, tenure, and promotion policies as incentives for innovation; and probably, too, to some degree, the realtive absence of change agents; and at least some negative experience with innovations.

Are the differences between innovative and non-innovative schools simply a matter of degree? Are there more change agents (or more forceful and effective change agents) in innovative schools? less inbredness of school district leadership? less unhappy experience with innovations? less imposition of bureaucratic procedures that limit professionalism? more professionalism? more autonomy? more participative decisionmaking? more effective information flows? more rewards for innovative behavior and dissemination of innovative approaches to other districts?

This may be a part of the story. Certainly there is ample testimony in the literature to the importance of the leadership factor in innovative schools and districts. And our observations would especially lend support to the importance of staff professionalism and minimal strain between professional autonomy and bureaucracy. Clearly, we need to learn a great deal more about this, especially how to develop more effective leadership in support of change, and more effective information flows and incentive structures to stimulate and facilitate innovation.

In one interesting study, researchers categorized the urban secondary schools they studied along two dimensions: number of innovations adopted and proportion of high quality innovations adopted.[65] Their findings are summarized in Table 14.1. They classified 22% of these schools as "pacesetters" (i.e., adopting larger numbers of innovations, including most of the high quality ones); 24% as "faddist" (adopting larger numbers of innovations but few of high quality); 14% as "selective" (adopting fewer innovations but most of the high quality ones); and 40% as "backward" (adopting fewer innovations and especially few of the high quality ones). It would be useful to have information of this kind about not only innovation adoption but also innovation implementation. And it would seem especially important to gather data that would shed light on what factors account for the differences among these four types of schools.

Table 14.1

Proportion of High Quality Innovations Adopted

Number of Innovations Adopted	High (More than 50%)	Low (50% or less)
High (5-14)	22% Pacesetter Schools	24% Faddist Schools
Low (1-4)	14% Selective Schools	40% Backward Schools

N=653 schools

For the present, we are simply left with the uncomfortable feeling that the bulk of the literature describes schools in ways that emphasize the barriers to change despite the fact that there is a substantial amount of innovation taking place. These descriptions are interesting, and they may be useful for suggesting certain sources of resistance that may (or may not) be present and may need to be planned for. However, they may be misleading if innovation strategies are developed on the basis of the impressions one gets from this literature. What this literature suggests is that there is likely to be substantial resistance to change in schools and that the success of attempts at innovation is likely to be determined by how effectively this initial resistance is overcome. As we shall see in the next section, this is too simplistic an approach to innovation in education and may in fact result in failure when an attempt is made to implement an innovation.

III. FINDINGS FROM IMPLEMENTATION RESEARCH

We have been particularly impressed by three studies which we believe point in more fruitful directions for policy thinking about facilitating the implementation of innovations in education. We will therefore summarize the findings of each of these studies and their possible policy implications, and then suggest the kinds of unanswered questions raised in our minds by these studies and the literature we have already considered.

1. Gross, Giacquinta, and Bernstein, Implementing Organizational Innovations[66]

Gross, Giacquinta, and Bernstein studies an attempt to implement a radical change in a small elementary school. The change required that teachers change their role model from that of the traditional teacher who fills students heads with learning, to a newer perception of the teacher as a catalyst who helps students learn how to learn, shift attention from the content of learning to the process of learning, enables students to discover the intrinsic satisfactions to be derived from learning and discovery, encourages them to become self-motivated and self-directed, and enables them to become increasingly responsible for their own learning. The change required teachers to redefine their roles in relation to their students and to radically change their behaviors in accord with this new role model.

The particular innovaton was of interest to Gross and his colleagues as an excellent vehicle for exploring the problems of organizational innovation. They conceptualized organizational change in terms of behavioral changes required of an organization's members. Some behaviors, they noted, are determined by personality needs and values. Other behaviors, however, are determined by "structured roles within a system." As they conceived it, organizational change is designed to change these organizational behaviors (i.e., those behaviors related to organizational goals), so as to resolve some organizational problems and/or to improve the organization's performance.

They began their analysis with a review of the literature on planned change, which they criticized as unduly focused on the adoption of innovations and insufficiently concerned with their implementation. They noted in particular that the literature places a great deal of emphasis on: (a) the significance of conditions antecedent to change efforts, and the importance during the adoption stage of (b) outside change agents, and (c) subordinate participation. The reason for this appears to be that most change theorists have assumed the inevitability of staff resistance to innovations and therefore see the success of efforts to implement innovations as determined by their effectiveness in overcoming this initial staff resistance. Thus, the importance of the factors pinpointed in the literature. Antecedent conditions are likely to affect the intensity of resistance. (Past unhappy experiences with innovations, for instance, are likely to increase resistance. Greater community pressure for change is likely to decrease resistance.) Outside change agents (or highly effective management of the adoption process by an organization's own leadership) are seen as important primarily for overcoming this initial resistance. For much the same reason, theorists have argued for wide staff participation in the initiation of the innovation process (leading to the adoption and introduction of the innovaton), so as to give the staff a sense of "ownership" of the innovation and thereby overcome initial resistance that is especially likely when change is imposed from the top down.

Gross, Giacquinta, and Bernstein argued that there was relatively little evidence to support these various assumptions. They then collected data on the key variables identified in the literature, so as to be able to assess their importance an to provide evidence for their own, more complex view of the innovation process and the factors that determine its success.

The innovation they studied was of the "top down" variety. Therefore, if the literature was correct, initial resistance should have been high and the staff should have had little commitment to it. Instead, the data showed that the staff initially supported the innovation and was positively oriented toward change. Whatever resistance was found by the researchers developed after the implementation process had begun, but not at the time of the innovation's adoption or when it was first introduced.

Equally interesting, most of the factors suggested by the literature as important for insuring that the innovation would be implemented were to be found in this case. Both the external and the internal conditions described by change theorists as important antecedents to successful change were there. The climate of the school was highly conducive to change. The previous period was one of change at the school. School norms supported change. The staff was willing to make changes and even seemed committed to the changes. Financial and personnel resources needed to support the change efforts were provided. Both the school system's officialdom and the surrounding community were strongly oriented toward change and recognized the need for significant changes to be made to improve the school's performance. The school system even hired an outside change agent to facilitate the innovation process, meeting a further condition emphasized in the literature.

In short, all the antecedent and prevailing conditions in and around the school were highly supportive of change. Despite this, the researchers found that the degree of implementation of the innovation was minimal. The key question the researchers sought to answer was: Why? Why, despite the presence of conditions which the literature suggested should support successful innovation, was this innovation not implemented?

The answer they found was in the circumstances that arose after the introduction of the innovation, during the implementation process. The approach to planned change found in the literature was, they argued, too simplistic because it ignored the fact that the problems that accounted for the failure of an innovation attempt might arise during the implementation process, that a school's management is so central to the functioning of an organization that its behaviors may be critical in either creating or resolving these problems, and that the members of an organization who were initially favorable to an innovation might actually become resistant to it later in the innovation process because of the frustrations they experienced in trying to implement the innovation.

Gross and his colleagues argued for an alternative view that conceptualized "the success or failure of the implementation of organizational innovations as the result of a complex set of interrelated forces that occur, once the innovation has been introduced, over an extended period of time" and took cognizance of the fact that this interrelated set of forces "can shift over time."

Their data showed that five obstacles accounted for the failure of this innovation attempt: (a) the staff's lack of clarity about the innovation and its requirements; (b) the staff's lack of capability to perform the new role model; (c) the unavailability of necessary materials to support its implementation; (d) the incompatibility of existing organizational arrangements with the requirements of the innovation; and (e) staff resistance to the innovation. The first four of these conditions existed when the innovation was first introduced, and persisted throughout the innovation process. The last of these, however, staff resistance to the innovation, emerged only during the implementation effort and was a result of the frustrations produced by these other problems.

The researchers found the root of these difficulties in management's faulty view of its role and what was required for the process of innovation. Because they assumed success required only focusing on overcoming any initial staff resistance, they failed to anticipate, take cognizance of, or adequately cope with the problems that were emerging <u>during</u> the implementation process.

Initial staff resistance may or may not be present, they argued. In any given change effort, the existence of initial staff resistance must be established empirically, not assumed. The assumption of initial staff resistance is based on the premise that an organization's members are highly satisfied with the way things are. In fact, however, there is often a substantial amount of dissatisfaction in organizations because the members (in this case the school staff) may be exposed to difficult problems that are not being resolved. In many such cases, then, the staff is likely to welcome an innovation if it seems to have the potential of overcoming some of these difficulties.

Gross and his colleagues argued that the error of all too many innovative attempts is overlooking the complexity of a given innovation and the difficulties it is likely to present during the implementation process. What is called for, then, is a recognition of the critical role management must play in anticipating implementation problems as inevitable and providing mechanisms and supports to overcome these problems -- training and other supports to resocialize teachers and to enable them to unlearn old behaviors while learning new ones, and workable feedback systems so that problems can be identified before they become unmanageable.

This study suggests to us the need for: development of a better understanding of the implementation process as "a dynamic process involving a complex set of interrelated variables"; the development of programs to train innovation managers in analyzing and skillfully managing these interrelated variables; and the development of the kinds of implementation supports they may require to facilitate successful innovation.

2. Sarason, The Culture of the School and the Problem of Change[67]

In The Culture of the School and the Problem of Change, Seymour Sarason provided a fascinating analysis of why major innovations have failed. He analyzed two change efforts, an effort to introduce the "new math" into an elementary school and an effort to establish an MAT program at a prestigious university.

In both cases, Sarason argued, surface changes were made but real change did not occur. The reason, according to his analysis, is that the changes that were made failed to affect relationships among people (teacher-student relationships, teacher-administrator relationships, parent-teacher relationships, etc.). And the reason for this was that the changes that were made did not challenge the assumptions and the behavioral and programmatic realities that people take for granted. An adequate theory of change, he suggested must start from an adequate description of what needs to be changed, and this requires a close examination of the regularities that characterize the school culture.

The problem with most approaches to change, Sarason pointed out, is that they tend to focus on individual personalities rather than complex role relationships. What would seem to be essentail to effective change efforts is an understanding of the complexity of each role in the school structure, its demands, the inherent conflicts within each role and its relationship to other roles and to the overall system of relationships. (Thus, Sarason, like Gross and his colleagues, focused on role relationships and the need to fundamentally affect these role relationships that people take for granted.)

Most change theories, Sarason pointed out, are developed by outsiders (generally do not adequately understand the school culture and therefore have unrealistically simple notions of how to bring about change) or by insiders who do not themselves identify with the school culture (and who therefore are also not likely to understand that culture or to be able to deal effectively with it). Sarason did not fall into either of those two categories since, although he was an outsider, he and his colleagues from the Yale Psychoeducational Clinic were working with the school personnel they studied in an ongoing helping relationship. The researchers were helping teachers to deal with some of their problems while they were also observing and analyzing the school's behavioral regularities.

The observations suggested that in these cases little real change occurred and the purposes of the innovations were not achieved, because people continued functioning much as they had before. The change stimulus came from outside the school culture. There was little or no attention to the characteristic regularities of the school culture and their possible social and psychological correlates. And, there was an unverbalized assumption that the changes could be achieved without affecting any of the regularities of the school culture.

Sarason's analysis is probably the most useful single piece in the literature for underscoring the fundamental problem in radical changes -- i.e., that they tend to require that people both unlearn old behaviors and ways of thinking while learning new ones. In order to change an existing reality, the people who are being asked to change must come to some understanding of what regularities must be changed, what the rationales were for the existing regularities, and what "universe of alternatives" for meeting the same needs might be considered. Those regularities tend to be taken for granted and assumed to be the only way things are done. Why, for instance, do teachers make all the rules for students' classroom behavior? What purposes are those rules supposed to achieve? Are there some other ways the same purposes might be achieved that might also make life in classrooms more pleasant?

Sarason's analysis shows that regularities exist because they are supposed to have intended outcomes which are discernible in overt behavior and various kinds of interactions, and they are generally justified by value statements. But, at the same time, there are frequent discrepancies between these regularities and their intended incomes. Unfortunately, school personnel rarely become aware of those discrepancies because there is no regularity built into the school culture to facilitate the recognition of these discrepancies. Once some mechanism is established to point out these discrepancies and help the staff understand the wider range of alternatives that might be considered for achieving the same purposes without such discrepancies (and this is the sort of mechanism Sarason and his colleagues were trying to establish), real change becomes more likely.

Much of the space in Sarason's book is devoted to analyzing some of the regularities and inherent dilemmas and conflicts within the roles played by the principal and the teachers in a school. That analysis is fascinating in itself. We took note of many of Sarason's points earlier when we considered some of the sociological descriptions of school functioning and especially the barriers to change created by the tensions between the school's bureaucratic structure and the teacher's image of professionalism.[68]

For our purposes here, the parts of the book that are most useful are those in which Sarason showed how he helped teachers change their perceptions of their role by giving them alternative ways of seeing their problems and avoiding premature closure. Once he was able to get teachers to verbalize their assumptions, the teachers found themselves disagreeing with what they were doing, seeing that their behaviors (based on assumptions they were not even themselves aware of) were having effects they did not want. Once they saw for themselves what their assumptions had been, how they viewed their own role, and what behaviors their views implied, they came to understand the need for change. Their examination of alternative ways of viewing how to achieve their objectives opened up ~~for~~ them new avenues to bring about the needed changes.

Sarason's point is that the way problems are verbalized affects the way they are resolved. If the formulation of a problem is structured in a way that permits the problem to be reformulated on the basis of new information, then there is more likely to be a change-oriented response when the staff comes to see the range of alternatives that might be considered to meet a given need. He agreed that innovations are often resisted because an organization's members fail to see the universe of alternatives to current practice, and seeing this is the beginning of positive change. The implication whould seem to be that change efforts must begin with an understanding of the behavioral regularities that must be changed for successful implementation of a proposed innovation, what the intended outcomes are, and how existing practice and the proposed innovation compare in terms of achieving those outcomes.

If schools are to become self-renewing structures, they will require that mechanisms likely to facilitate such staff analyses are built into the school's structure and modes of functioning.

Sarason pointed to the example of Dewey's school as a model of what may be needed. As principal, Dewey functioned truly as an educational leader in a setting that emphasized colleagial relationships among the staff. Staff conferences were one of the school's built-in regularities, stimulating teachers' minds, satisfying their needs for new learning and understanding, and keeping them focused professionally on the needs to be met and the problems encountered as well as the range of possibilities that might be considered for meeting those needs. In this kind of school, one would assume the psychological loneliness of the teacher was minimized, professionalism was stressed, and there were as few strains as possible between the requirements of bureaucracy and professionalism.

3. <u>The Rand Corporation Change Agent Study, Federal Programs Supporting Educational Change</u>

Beginning in 1973, a Rand Corporation research team headed by Paul Berman and Milbrey McLaughlin, funded by the Office of Education, studied four federally funded change agent programs. The four programs were: the Elementary and Secondary Education Act Title III, Innovative Projects; the Elementary and Secondary Education Act Title VII, Bilingual Projects; the Vocational Education Act, 1968 Amendments, Part D, Exemplary Programs; and the Right-To-Read Program. Their multi-volume report includes: a survey of the literature on planned change in education and the development of a conceptual model of factors hypothesized to affect change provesses in school districts; analyses of survey data from a national sample of 293 projects in 18 states; analyses of 29 case studies of hange agent projects selected from the sample of 293 surveyed earlier; a summary of findings and possible policy implications; and various technical appendices.

The study was designed to identify which factors do and which factors do not promote change at the local school district level. The innovations selected all involved the creation of "temporary systems" designed to bring about reforms "within or through" the existing school district structures. The conceptual model formulated by the research team gave particular weight to the interactions between the innovations studied and the institutional settings where they were implemented. The researchers hypothesized that the innovation's characteristics as implemented in a given setting would be affected by: the innovation's initial characteristics; the support it received in the particular school district; the characteristics of the institution that changed during the implementation; and the characteristics of the institution that did <u>not</u> change. (The Rand team explored a broader array of questions, but we will focus our attention primarily on this aspect of their research.)

The researchers found that the projects they studied differed significantly in terms of (and as a result of) the kinds of initiation processes that led to their adoption in a given school district. In some cases, the motivation was largely <u>opportunistic</u>: money was available, and sothe district decided to adopt a given project even though there was no strong commitment in the district to the project's goals. In other cases, the adoption decision was the outcome of a process of local <u>problem-solving</u>, with the project being adopted because it was seen as meeting a local need. (However, even in the case of the problem-solving mode, the innovation was usually adopted without any wide "search for alternatives" and weighing of evidence on alternatives designed to meet the district's need. Generally, the adoption process in these "problem-solving" cases was based largely on intuitive approaches to assessing likely effectiveness, not the rational decisionmaking models generally associated with problem-solving behavior as this is described in the literature.)

Four kinds of implementation processes were identified from the data analysis: (a) pro-forma implementation or "technological learning" (the project was implemented without modification or any effort to adapt the institutional setting to the requirements of the innovation; (b) cooptation (the project was modified to fit the institutional setting, without any adaption of the institutional setting); (c) non-implementation (the project was implemented only symbolically or not at all); and (d) mutual adaptation (both project and institutional setting were adapted to each other). (We considered these patterns earlier in this chapter.)

The type of implementation process found in a given setting depended on: (a) the motivations and conditions that led to a project's being implemented (opportunitistic vs. problem-solving); (b) the substance and scope of the change required (how comprehensive an innovation, how congruent with existing arrangements, etc.); and (c) its implementation strategy.

Those projects that were implemented effectively generally showed the mutual adaptation pattern. And only projects initiated as a consequence of problem-solving (rather than opportunism) showed evidence of the mutual adaptation mode.

Effective implementation strategies included: adaptive on-line planning, staff training keyed to the local setting and emphasizing practical classroom issues (rather than theoretical concepts), local staff development of materials (rather than external development by consultants or R&D organizations), and allocation of a "critical mass" of staff to the project to insure that the project did not become isolated and was provided with needed mutual staff support.

As to the substance and scope of change, projects that were implemented effectively tended to be those that were perceived as high priority items, were congruent with staff values and goals, required changes in teacher behaviors and also required comprehensive changes in the behaviors of several other, different actors in the institutional setting. Neither the type of technology involved in a given project or the resource level allocated were significantly related to the success of the project's implementation.

The receptivity of the institutional setting to change was of critical importance in affecting implementation. Especially important were staff commitment to the project, high teacher morale, teacher willingness to invest the additional energies required by the changes, and support from the principal and district administrators.

Institutional receptivity, then, was an essential condition for effective implementation. But also needed were implementation strategies that promoted mutual adaptation.

At the classroom level, project continuation after federal seed money ran out was more likely where the innovation involved replacing existing practices rather than simply supplementing them. Continuation was also more likely where the implemenation stage had included training, where that training was focused on practical problems in local classrooms, and where materials for the project were developed locally. At the district level, however, continuation decisions were based on whether or not district officials viewed the projects as: (a) successful, (b) affordable, (c) related to district priorities, and (d) politically acceptable. Opportunistic projects were generally viewed negatively on at least the first three of these criteria, whereas projects initiated as a result of problem-solving were more likely to be viewed positively on all four points. "...in effect, the pattern of expected continuation tended to follow the pattern evidenced during initiation. It is important to note that the superintendents' perception of project "success" seemed to reflect attitudes formed during initiation rather than after evaluation, which was seldom considered seriously."[70]

The rand team summarized their findings as follows:

> Our data show that a receptive institutional setting is a necessary but not a sifficient condition for effective implementation. An implementation strategy that promotes mutual adaptation is critical.
>
> The main factors affecting innovations were the institutional setting, particularly organizational climate and motivations of participants; the implementation strategy employed by local innovators to install the project treatment; and the scope of change implied by the project relative to its setting. Neither the technology nor the project resources nor the different federal management strageties influenced outcomes in major ways. The project outcomes did not depend primarily on "inputs" from outside but on internal factors and local decisions.[71]

The policy implications they drew from this were that federal policies should: (a) encourage mutual adaptation strategies, (b) help school systems develop the capacities they need to effectively implement innovations, and (c) stage federal funding for innovations to the stages of the innovation process, to make certain that innovations are not only adopted but also implemented and then incorporated into existing practice and also perhaps to support the capacity building required for success in each of the stages of the innovation process.

4. Implications of the Findings from Implementation Research

It would seem, on the basis of the findings we have reviewed in this section, that effective implementation of innovations will require considerably more understanding than we have now about the implementation process and its requirements, considerably more skill than we have yet been able to show in managing the innovation process, and the development of needed capacities in local school districts to support the innovation process.

At the very least, we need to understand: what kinds of changes are required for effective implementation of different kinds of innovations; how commitments to these needed kinds of changes can be developed more effectively; what sorts of implementation supports are required for different kinds of changes; what sorts of management strategies and skills are needed to effectively manage a change effort throughout all its various stages (initiation, implementation, and incorporation); what sorts of capacities are needed at the school district, school and classroom levels to permit effective implementation of innovations; what sorts of policies are most likely to make schools more receptive to change efforts; what sorts of mechanisms are needed to provide an on-going self-renewal capacity at the school and district levels; what sorts of dissatisfaction in schools exist to be capitalized on in support of change efforts; what approaches are most effective for overcoming initial resistance to innovations of particular kinds in schools and districts of various kinds; what kinds of feedback mechanisms are most effective for identifying problems that emerge during the implementation of an innovation and what sorts of management techniques are most effective for overcoming these; what the most effective balance is likely to be between bringing in external resources and calling upon internal resources to support the implementation of different kinds of innovations, in different kinds of institutional settings, having varying levels of internal capacities for innovation; what kinds of adaptations of project and institutional setting are likely in a given instance and how might these be best planned for; etc.

Despite the accumulating knowledge base in areas such as OD, few if any of these research questions have been adequately answered to serve as a basis for policy development. Lacking are not only the answers to the questions but even the kind of emerging consensus on fundamental questions and appropriate methodologies that would seem to be needed as a basis for the development of an implemenation research field of inquiry. What would seem to be called for is direct attention to capacity-building concerns -- both capacity building on the school district level (to support effective implementation processes) and capacity building in the research community (to increase the likelihood of our finding sounc answers to some of these questions and directions for development work to further enhance implementation capacity building at the local school district level). Perhaps in time, implemenation researchers teaming up with LEA implementation personnel can develop analytical tools that will enable school districts to analyze for themselves: the implementation requirements for given innovations, the existing regularities in school functioning that need to be changed to support an innovation's implementation, and the kinds of mechanisms and management strategies they will need to increase the likelihood of effective implementation of a given innovation and its incorporation into the school's standard, routine operating procedures and practices. We shall have more to say about this shortly.

In summary, there is an extensive knowledge base about operating system norms, values, and various kinds of constraints that may make teachers, principals, and other operating system personnel resist certain kinds of innovations. Far less is known about the technical problems that make innovation difficult, or the kinds of implementation supports needed to overcome these problems, or evan how to go about identifying potential technical problems, assess operating system capabilities in relation to these technical problems, or design training programs, technical assistance roles, or other required implementation supports. And there is highly suggestive evidence that the technical problems may be of far greater significance for determining the fate of an innovation than attitudinal problems. More practice-based research and systematic evaluation of implementation support strategies will be needed to develop an adequate knowledge base to permit efficient and effective attack on the technical problems of innovation implementation in education.

IV. RECENT INITIATIVES TO STRENGTHEN THE IMPLEMENTATION/UTILIZATION FUNCTIONS AND LOCAL SCHOOL SYSTEM CAPACITIES FOR SELF-RENEWAL

Over the last decade, and especially in the last three or four years, there has been increasing federal and state attention to the need to provide active assistance to school districts in acquiring external resources to support innovation (information, products, programs, expert consultants, etc.) and developing their own internal resources to facilitate innovation. In a previous chapter, we already considered in some detail the shift in emphasis in federal dissemination policy form relatively passive modes of information dissemination to providing more active assistance in gathering and tailoring information to the specific needs of a particular school district.[72] In addition, in recent years several new forms of direct sarvice to school districts have gained increasing prominence and support -- not only the school study councils, instructional materials centers, and various forms of in-service training programs that have been around for a while, but also teacher centers, technical assistance programs, increasing numbers of private sector consulting organizations, and various state and interstate networks of school service organizations. We consider some of these newer forms here.

1. Types of Programs

A 1975 survey identified well over 1000 educational linkage programs in the United States.[73] Some were of the traditional information dissemination variety. Others, though, were of the more active, implementation/utilization support or self-renewal forms. The researchers developed a six-fold taxonomy to classify the various linkage programs. The dimensions of this taxonomy are enumerated in Table 14.2. As shown here, the scheme categorizes linkage programs according to: the level of sponsorship and/or service provided (national, state, regional, or local); the institutional base (government, university, private, etc.); the type of service provided (information, instructional materials, technical assistance, or continuing education); the focus of the services (general, subject specific, product specific, or audience specific); the type of interface(s) with clients (print, media, or human interpersonal services); and the source of initiative for undertaking the services (the client or the staff of the service organization).

Based on this taxonomy, the research teach developed a classification scheme of more than 40 different linkage models, which they then simplified into the taxonomy of linkage programs presented in Table 14.3. This listing shows ten main categories of programs, along with sub-categories relevant to each. Each sub-category listing is followed (in parentheses) by the name of one example of a program of this type. Thus, ERIC is used to illustrate the first type of linkage program, a federal-level information program providing general information on a wide range of subjects. The Research Coordinating Unit of the Tennessee State Department of Education is used to illustrate a state level information program on a focused (rather than general) area of subject matter (in this case, vocational education).

We are concerned in this chapter with programs in five of the ten main categories listed here. (We already considered the programs in the other five categories in our chapter on the dissemination function.)

TABLE 14.2

TAXONOMY OF EDUCATIONAL LINKAGE PROGRAMS AND SERVICES

1. Level of Sponsorship and/or Service

   National
   State
   Regional
   Local

2. Institutional Base or Setting

   Government, Centralized
   Government, Decentralized
   Professional Association
   University
   Private, Non-Profit
   Private, For-Profit
   Consortium

3. Service(s) Provided

   Information
   Instructional Materials
   Technical Assistance
   Continuing Education

4. Focus of Services

   General
   Subject Specific
   Product Specific
   Audience Specific

5. Interface(s) with Client

   Print
   Media
   Human

6. Initiative for Undertaking Services

   Client (Demand Services)
   Staff (Scheduled Services)

TABLE 14.3

TAXONOMY OF LINKAGE PROGRAMS

1. Information Programs and Centers

   Federal, General Subject Matter (ERIC)

   Federal, Focused Subject Matter (Special Education Instructional Materials Network - SEIMC/RMC)

   State, General Subject Matter (Project Communicate, Kansas State Department of Education)

   State, Focused Subject Matter (Research Coordinating Unit, Tennessee State Department of Education)

   Regional, General Subject Matter (Research Information Services for Education, Pennsylvania)

   Proprietary Information Project, Focused Subject Matter (XEROX Curriculum Clearinghouse)

2. Teacher Centers

   State Consortium (Texas Teacher Center Project)

   Regional Consortium (Bay Area Learning Centers, California)

   University-Based Individual Center (Workshop Center for Open Education, City College, New York)

   Independent Center (Advisory and Learning Exchange, Washington)

   Residential Center (Teacher Center, Academy of the Sacred Heart, Greenwich, Connecticut)

3. Technical Assistance Programs

   Technical Assistance for Planning (Educational Planning Specialists of New Jersey Model Cities Program)

   Consortium for Multi-Product Implementation (Northwest Laboratory/Far West Laboratory/Central Midwestern Laboratory/Wisconsin R&D Center Consortium)

Table 14.3 (cont.)

4. Professional Association Programs

   Retrieval Services (School Research Information Service, Phi Delta Kappa)

   Information Collection and Synthesis (Educational Research Service, independent but co-sponsored by five professional associations)

   Multi-Faceted Information Program (AERA)

5. School Study Councils

   Emphasis on Staff Development (Network of Innovative Schools, Massachusetts)

   Emphasis on New Product Development (Educational Research and Development Council of the Twin Cities Metropolitan Area, Minnesota)

6. Broadcasting for Educators

   Information Services (KETS-ETV, Arkansas)

   Brief Workshops (KET-ETV, Kentucky)

   Longer Courses (WHA-ETN-SCA, Wisconsin)

7. Publishing for Educators

   Professional Books (Education Division, University of Chicago Press)

   Professional Magazines (Learning Magazine)

8. College and University Education Libraries

   Emphasis on Search Services for Educators in Field (University of Indiana Education Library)

TABLE 14.3 (cont.)

9. Inservice Training

College Based (California State University at San Jose)

District-Based (San Francisco Public Schools)

10. Miscellaneous Linkage Programs

District-Based Instructional Materials Center (Instructional Materials Center, Sunnyvale, California)

Evaluated Product Information (Educational Products Information Exchange, New York)

Proprietary Consulting and Research Services (Westinghouse Learning Corporation, New York)

State Education Agency Consulting Services (Consultants, Utah State Department of Education)

School Research Office (Dade County, Florida)

A. Teacher Centers

Teacher centers may be single, independent units (such as the Washington-based Advisory and Learning Exhcange or the residential teacher center at the Academy of the Sacred Heart in Greenwich, Connecticut). Or, they may be affiliated with universities (such as the Workshop Center for Open Education at City College in New York City). Or, teacher centers may be linked in various state consortia (such as the Texas Teacher Center Project) or regional consortia (such as the Bay Area Learning Centers in California).

The idea of teacher center networking received strong endorsement from NIE's School Capacity for Problem Solving Group. In a planning document, the NIE group described their interest in the teacher centers, and especially in supporting the development of networks of such centers, as follows:

> The strengthening and extending of networks of teacher centers are important to us because such centers perform many of the functions essential to problem solving as an effective approach to school improvement. The centers we find most promising help teachers solve their own problems in such areas as classroom management, the creation of physical and social environments favorable to learning, selection and implementation of curricula, individualization of instruction, and others. They are places where teachers can reflect on their concerns, find information relevant to them, work out solutions, and get help in carrying them out.
>
> In addition, such teacher centers address a long-felt and well articulated need for teachers to gain control over their own professional development. They help to reduce the isolation of the self-contained classroom. They provide a climate of support where teachers can exchange ideas and engage in joint activities without fear of failure. They provide opportunities for teachers themselves to become active learners, to develop and try out curriculum ideas, to engage in research and to continuously grow as professionals. They carry out their activities through the voluntary participation of teachers 74

The NIE group noted that, at the time they were doing their planning in 1975, there was growing interest in teacher centers -- in Congress, in professional associations such as the NEA and AFT, and especially in state departments of education which "have begun to experiment with centers as the primary mechanisms for delivering staff development services." However, they argued, "There is little reason to believe that these efforts will be informed by the experience of those who struggled for many years to develop, adapt, and refine the teacher center concept -- unless the government engages in a deliberate effort to find ways of linking these originators with emergent centers."[75]

B. Technical Assistance Programs

Technical assistance programs have become highly visible in recent years. They may be government-funded groups (such as the Educational Planning Specialists of the New Jersey Model Cities Program, or various technical assistance centers set up with government funds to facilitate implementation of various kinds of categorical legislation -- the Emergency School Assistance Act, or Title IX legislation, etc.). Or, they may take the form of consortia of various quasi-public organizations (for instance, the consortium established by several labs and centers to provide assistance to school districts trying to use their products, or the network of schools established and assisted by Research for Better Schools and the Pittsburgh R&D Center to facilitate the implementation of the IPI program). Or, a technical assistance center may be set up to provide assistance to school districts trying to implement a single product (an example here is the development center established to assist schools in implementing the Indiana Social Studies Program).

NIE has supported two studies of technical assistance groups in recent years, in order to increase the field's understanding of what kinds of technical assistance strategies may be most productive in facilitating school improvement. Both studies were carried out by the Center for New Schools. In the first of these studies, the research team produced brief descriptions of more than 75 organizations that attempt to facilitate educational change at the school/community level.[76] From This group, they selected six organizations for in-depth case studies and described both in individual case studies and cross-case analyses): the history of each group, their current methods of internal functioning, their philosophy of change and of the role of a technical assistance group in the change process, an analysis of two technical assistance projects carried out by each group, and an analysis of the patterns of technical assistance activity provided and which patterns were most effective under different conditions.[77] We shall examine their finding later in this chapter.

The second study was part of the Center for New School's less successful Documentation and Technical Assistance in Urban Schools Project. The project had initially been developed by NIE to: (a) document the problem-solving process as it was carried out at the local level in model projects; (b) use the documentation data base to develop technical assistance strategies and materials which could be disseminated to and used in other school districts; and (d) increase our understanding of the processes through which research can inform practice and practice can inform research, through self-conscious observiation of the DTA project's functioning in a research-on-research mode. However, the project broke down at the documentation level, provided the field with relatively little that was new or useful,[78] and was largely terminated.

C. Broadcasting for Educators and In-Service Training

Educational television and in-service training have been used widely for some time now. They are of interest to us here because of their potential for use in providing training to support the implementation of externally developed innovations or development of local capacities for self-renewal or local development activities. Research (particularly the Rand study) suggests that these programs are likely to be most effective if they are provided within the school district and if they are tailored to local conditions and focused on practical issues arising in local classrooms rather than on theoretical concepts or hypothetical problems or cases.

D. Consulting Services

In addition to the types of organizations described above, private sector consulting organizations have become increasingly conspicuous in the educatio sector -- providing evaluation services or training programs, diagnosing district needs or conducting feasibility studies for proposed innovation, etc. SEAs at one time opearted to a significant degree through sending around their staff in consultant capacities to assist school districts, and at least some SEAs seem to be showing renewed interest in the consulting approach (for instance, the Utah State Department of Education). Relatively little data has been published as yet about these various consulting arrangements that are available to serve the field of education. Data from NIE's Education KPU Monitoring Program organizational survey, when it becomes available, may provide some of this needed information.

E. State and Interstate Networks

State and interstate networks do not represent an additional category of organizations but a different dimension for classifying some of the organizations already noted above. These networks have been given increased visibility and some increased support through NIE's sponsorship of its R&D Utilization Program. State networks of regional intermediate service agencies have been developed in approximately 25 states, and some other states have developed implementation support programs using other organizational arrangements. Interstate networks of various kinds have also been in existence, to link schools or districts dealing with similar problems or using similar approaches. Examples of such interstate networks include: the ES '70 schools, the Network of Innovative Schools, and the RBS Network of Schools using Individually Prescribed Instruction. (We considered some of these networks earlier.)

NIE's R&D Utilization Program may have stimulated the development of more such networks. It would be useful to gather some data on whether this in fact happened. The RFP for the R&D Utilization Program[79] called for proposals from existing or proposed networks that focused on "providing services to schools to implement and use existing research and development (R&D) outcomes." The long-term effects expected at the local level were described as follows:

- An increase in knowledge on the part of educational personnel and community members of the existence, nature and utility of research and development outcomes;

- An increased number of formal assessments of the potential of specific R&D outcomes for local use;

- An increase in the instances where R&D outcomes or appropriate adaptations are implemented successfully;

- An abatement of local problems as a result of the successful implementation of R&D outcomes or appropriate adaptations to meet local needs.

The RFP specified that what was of interest to NIE were proposals which combined: (a) activities to implement R&D outcomes so as to help solve educational problems; with (b) substantial linkage of appropriate agencies (profit or non-profit agencies, SEAs; ISAs, LEAs, regional or national R&D agencies, colleges and universities, professional associations, teacher centers, information clearinghouses, community gourps, etc.). Specifically, the RFP indicated that NIE would fund selected projects organized into four configurations of implementation support agencies: (a) a state-organized system of intermediate service agencies; (b) a state system not using intermediate service agencies; (c) an interstate consortium of schools organized as a group of users; and (d) an interstate consortium of agencies primarily devoted to the production of R&D outcomes and/or the delivery of technical assistance services.

The following excerpts from the RFP should provide some sense of the kinds of linkages NIE had in mind:

> <u>A State-Organized System of Intermediate Service Agencies.</u> In states where formal, state-authorized or created sets of intermediate service agencies exist, a program to systematically use R&D outcomes to help solve educational problems and improve educational opportunity may be proposed. The project would focus on the intermediate service agency as the contact point and <u>primary</u> source of services to schools. Other agencies committed to the improvement of education in that state should be involved as appropriate. Included would be the SEA, colleges and universities (such as teacher training divisions), regional or national educational laboratories, and other relevant agencies or groups. The proposal could come from the SEA; a state-wide or intra-state regional consortium of intermediate service agencies; a single intermediate service agency which has a significant service area and population and which has been formally designated by the SEA as a prototype for the state; a college or university; or any public or private, profit or non-profit agency that represents all of the parties

involved in the state-organized system through an appropriate project governance structure.

<u>A State System Not Using Intermediate Service Agencies</u>. In States where no formal, state authorized or created set of intermediate service agencies exist, a program to systematically use R&D outcomes to help solve educational problems and improve educational opportunity may also be proposed. The SEA, one or more colleges and universities (including the teacher training divisions), or other agencies could serve as the contact point and primary source of services to schools. Other agencies committed to the improvement of education in that state should be involved as appropriate. Proposals could come from the SEA, a college or university or state system of higher education, or any public or private, profit or non-profit agency that represents all of the parties involved through an appropriate project governance structure.

<u>An Interstate Consortium of Schools Organized as a Group of Users</u>. The project would consist of an interstate consortium of users. The consortium would provide, or contract with others to provide, services to implement R&D outcomes to help solve their educational problems and improve educational opportunity in the schools represented. The key difference between this category and the one that follows is that the governance of the project proposed in this category is in the hands of a consortium of agencies formally constituted by state action to conduct instruction. Participants in the consortium may use outcomes developed by others, but may also be the source of R&D outcomes. Consortia in this category must designate a single public or private, profit or non-profit agency to act as the primary contractor, but it must be demonstrated that the governance of the project will be appropriately shared by the entire consortium. The consortium should also observe the need to involve appropriately other agencies committed to the improvement of the schools served.

<u>An Interstate Consortium of Agencies Primarily Devoted to the Production of R&D Outcomes and/or Delivery of Technical Assistance Services</u>. The project would consist

> of a consortium of producers of R&D outcomes and/or agencies providing services to schools. These producers must have organized themselves to develop a consumer-oriented R&D implementation system that will help solve school-based problems and improve educational opportunity. This could be a consortium of research and development centers or laboratories, or other non-profit or for profit producers of R&D outcomes, of SEA's, or colleges and universities with major divisions producing R&D outcomes. SEA's and ISA's may also be included as members of the consortium as appropriate. A single agency must be designated as prime contractor, but the governance of the project must be in the hands of the consortium. When appropriate to the problem addressed, a consortium organized under this category should also observe the need to involve other agencies committed to the improvement of the schools served.

The RFP made clear that NIE was interested in all four different configurations, both because it recognized that different configurations are likely to be more appropriate to different situations and because the Institute wanted to develop some sense of the relative effectiveness of the different forms.

One of the most interesting and encouraging aspects of this RFP was its includsion of a provision for a "third party" research contractor to provide the field with an understanding of what is involved in successful implementation of R&D. The RFP stressed that this third party researcher was not evaluating the work of the various contractors participating in the program. Rather, this "research on research" work would be focused on learning as much as possible from the project about:

> how to bring about successful R&D implementation, what the key variables in the process appear to be, and whether or not the assumptions behind the Institute's work in this field can be substantiated. The work of the "third party" research contractor will be directed at the general areas of (1) the nature of information/communication flow between the contractors (and subcontractors) and the school sites, (2) the characteristics

and frequency of the services provided, (3) the pattern of agencies involved in providing services, and (4) the extent to which specific organizational characteristics of the school sites are systematically considered in providing services.

In addition to these sorts of questions, we need to develop some understanding of the processes involved in providing the various kinds of services offered, and the sorts of interactions that produce success or failure in implementation efforts. But clearly, the sort of information called for here in this RFP is vitally needed and we look forward to seeing the data from this important initiative.

One other point should be made about the potential for future networking activity before we leave this topic. A 1975 NIE program plan suggested that the Institute was interested in making at least a modest investment in exploring networking for rural education and also for parent information centers, with the latter being seen as an important resource for the parent/community participation movement that emerged over the last decade and a half.[80] As yet, however, it is too early to expect to see much progress on this front, but initiatives in these directions would certainly seem to be warranted.

2. Models and Strategies.

There is not as yet much of a highly useful literature on these various change-oriented organizations or the strategies they use. Based on what has been written, the one thing they can clearly be said to share in common is an approach that leans toward the clinical change model of working with clients to adapt innovations, ideas, or information to local circumstances, as contrasted with the R&D delivery model of assisting school districts in acquiring standardized products developed by external R&D organizations.

Within that general orientation, a distinction can be made between models which rely largely on change resources brought in from <u>outside</u> the operating system and models which focus on developing needed resources <u>inside</u> the system. The key element in the distinction seems less whether the change effort is being directed by an external group (such as a training or technical assistance organization or a consulting firm) or an internal group (such as a school district's teacher trainers or a district OD or renewal team), but rather whether the effort is directed at <u>providing</u> resources to bring about change or <u>developing local</u>. resources to facilitate change.

A. Models

In a classic article, Ronald Lippitt distinguished six models of research utilization.[81] In the first three, knowledge and practices are brought in from outside to change the system. In the last three, the knowledge and practices that will be the basis of changing the system are developed within the system.

In the first model, a consultant identifies and defines a problem in the practice setting, retrieves relevant research and theoretical concepts from the field's knowledge base, and uses this knowledge to design an approach that will solve the identified problem and thereby improve practice.

In the second model, a new program, product, or practice is developed by an R&D organization external to the school system. This externally developed innovation is designed, tested, and perhaps also demonstrated, and then recommended for adoption. The client system then adopts or adapts the validated model developed elsewhere.

The third model involves the identification, validation, and diffusion of exemplary practices developed in other school systems, and especially their documentation in a manner that permits these practices or programs to be used elsewhere.

In all three of these models, then, the source of the knowledge or practices this will be used to change a particular system is located outside that system. This contrasts with the other three models which focus on development within the client system of the knowledge that will serve as the basis for solving the system's problems.

Model four is referred to as the diagnostic feedback model. An outside group of researchers/consultants gathers diagnostic data from school system functioning, focusing on a problem the school system is facing. The reseachers then analyze the data and provide feedback to the school system for their own use in solving their problem.

Model five, the internal action research model, differs from model four in that the data are gathered by the school system personnel themselves. The self-study is conducted by school system staff after they have been trained in data-gathering, analysis, and interpretation by applied researchers, who then supervise the action research process.

In the sixth and last model, the training of practitioners is carried one step further, to develop their capacities for fully self-directed local problem-solving. This model:

> focuses on the idea that the practitioner needs direct training in learning to be a consumer of science and of scientific resources in order to be an effective user of scientific knowledge. It is our observation that the desired collaboration between the consumer and the scientist often is impossible because the consumer or practitioner has received no basic training in how to use services of scientists or in how to use inquiry procedures in generating their own basic diagnostic knowledge for the development of their own practice.[82]

There are, then, a range of organizational arrangements used to carry out educational improvement programs, some involving the implementation and use of innovations developed elsewhere; others, focusing on developing internal information and resources for solving local problems or creating self-renewal capacities.

B. Strategies

We do not as yet know very much about the strategies used to provide implementation supports effectively. There is little in the literature that is useful for providing a picture of the kinds of strategies that promote successful implementation of externally developed products or programs. We would expect some of this information to be forthcoming from NIE's R&D Utilization Program, but we have not as yet seen these results.

Much more is now known about strategies that have been effective in developing local capacities for change. There is, for instance: some useful literature on the existing knowledge base for the design of change agent programs;[84] and there are even some training programs and resource materials for training change agents.[85] And, as we noted earlier, there is one very useful analysis of the strategies used by technical assistance groups.[86]

Examination of the literature suggests that there is significant variability in the patterns of functioning subsumed under the "change agent" label. For instance, one analysis distinguished four general categories of roles requiring somewhat different emphases in training programs: (a) programs to help school systems in developing a self-renewal capacity; (b) programs to train change agents oriented toward linking the school system to external resources; (c) programs to bring about political and structural changes in school systems; and (d) programs to improve the effectiveness of other educational agencies.[87]

Clearly, different kinds of strategies are likely to be effective for these different kinds of change agent roles. And different local circumstances are likely to call for different strategies. The Center for New Schools' study of technical assistance groups (TAGs), for instance, found that there was no one "best" strategy. Rather, what worked best in a given instance seemed to be related to the local situation. Therefore, they argued, what is called for is the development of a variety of approaches that can be responsive to differences in circumstances and values in various local settings.[88]

What all these change agent strategies seem to share in common, though, is an emphasis on the practitioner and the world of educational practice -- on the practice setting as the starting point for change efforts, on practitioner-initiated changes, on diagnostic work in the practice setting before developing solutions, on an outside helping role that is as non-directive as possible, and especially on developing and using the internal resources of the practice setting.[9]

The Center for New Schools study produced a good deal of detailed information about the processes used by technical assistance groups and some of the factors that seem to account for differential effectiveness. For instance, in the long-term face-to-face assistance cases they studied, they found that the groups that were most effective were those that: (a) were most skillful in mapping the social systems they were trying to change; (b) focused on changing "central rather than peripheral social processes and structures in the school community"; (c) provided well developed materials in addition to face-to-face technical assistance; (d) developed their technical assistance strategies through a pattern of periodic self-conscious analysis of their work, followed by more assistance-giving, followed by review and analysis agian, etc.; (e) functioned through a process of mutual adaption in which both the TAG and the client school system were adapting to each other; (f) focused their assistance efforts on highly specific targets rather than simply turning facilitators loose to provide any forms of assistance they decided might be needed (and functioned through teams of facilitators in given sites who received regular supervision and engaged in joint anlaysis to keep them on target); (g) encouraged independent initiative on the part of the client school system; (h) worked to promote the long-term incorporation of the changes so that the effects would remain after the TAG withdrew from the school system; (i) tried to transfer their own skills and knowledge to school system personnel, including the ability to map the environment and use cycles of action and analysis to evaluate this effectiveness and efine their techniques; and (j) tried to develop an awareness in school personnel that they were developing a new set of skills and were solving problems, and perhaps, too, that they were part of a broad educational or social movement of some consequence.

In addition, the CNS TAG study produced a number of other important findings. One was that there was very little of a discernible "ripple effect" in the change efforts they observed. What changed (if they were successful) was the specific focused target of their efforts, but little beyond that. If there was a strategic lever in the school structure, it was the principal whose attitudes could affect change in a range of areas. Still, there did not seem to be much evidence that producing change in one area somehow started a chain reaction that led to changes in other areas.

A second important finding was that at the very least a successful TAG change effort required three to four years and probably longer. Funding, however, tended to be cut off before that, and so the fruits of the long process were often not realized. The implication of this, they suggested, was that funding commitments for programs of this kind should be made for periods of five to seven years, with various evaluation criteria built in to permit sponsors to judge progress along the way.

The significance of the entry and relation-building process was underscored inthe CNS study. This period was all-important for the future success of the change effort, so as to establish the credibility of the TAG, to develop a mutual set of obligations and to set limits on what was and was not to be expected as part of their relationship, and to develop realistic notions about what could (and could not) be accomplished over how long a period.

Five main technical assistance techniques were identified: structured experiences (workshops), "over-the-shoulder" assistance and advice giving, modeling, providing materials, and direct intervention on behalf of the client to help the school system do something (e.g., write a proposal for funding). The most effective TAGs, according to the CNS findings, were those that used various combinations of the first four but kept the last (direct intervention) to a minimum to avoid dependency.

One of the most useful contributions made by the CNS study is their analysis of "critical activities" for TAG functioning. The CNS researchers defined critical activities as "those activities carried out by a TAG that are, based on our data, most important in establishing and maintaining the TAG as a viable organization and in enabling them to provide appropriate technical assistance services."[90] The critical activities they identified related to five areas of TAG functioning: (a) formation (forming the technical assistance group); (b) management (establishing and maintaining effective internal management); (c) funding (obtaining and maintaining funds); (d) strategy development (developing assistance strategies); and (e) assistance (carrying out specific assistance efforts). In all, a total of 100 separate activities were specified. Clearly, this analysis and the case study materials should be invaluable to any TAG group or other organizational arrangement to produce change.

3. Needed Research

A. Documentation and Process Analysis

Whatever knowledge is beginning to accumulate about effective models and strategies for promoting change in schools, we clearly need considerably more process analysis and documentation of both: (a) the processes required to successfully implement and institutionalize particular innovations, and (b) the processes involved in providing implementation and utilization supports.

School system personnel need to be provided with information about how to take a project description which elaborates the substance of a project and its expected effects and translate that description into precise tasks and activities and the needed skills, sensitivities, and other requirements to effectively carry out those tasks and activities. And implementation and utilization support personnel and other change agents need to be provided with process descriptions indicating how to carry out effectively, the tasks and activities required by their functions. Descriptions are needed from successful models indicating what happened and why, and what one needs to do to achieve the same kinds and degrees of success in other settings.

The difficulty of effective documentation and analysis is underscored by the less than adequate outputs of some of the attempts that have been made to analyze process analysis and documentation requirements[91] or to document and analyze given projects through case studies and cross-case analyses.[92] However, there are also some few notable successes from which we can learn.[93] Clearly, considerably more work is needed in this area, both to produce the needed documentation and analysis and to develop a body of effective procedures and techniques for carrying out this kind of work.

B. Basic Data on the Institutional and Personnel Base for These Functions

Given the recency of federal awareness of the importance of these functions, it is not particularly surprising that we are lacking even the most basic kinds of information about the nature and scope of the institutional and personnel base available to be drawn on to carry out these functions. We know very little, for instance, about: how many organizations (or organizational units) there are which carry out these functions; what types of organizations they are; how they are distributed geographically and by services provided; how many school districts they serve; what strategies they use, with what degrees of effectiveness; what kinds of changes they promote; what personnel bases and other resources they draw on; the nature of their linkages with KP as well as KU or other linkage organizations, etc.

Some information useful for gauging some of these questions may be provided from data collected by NIE's Education KPU Monitoring Program organizational survey. But since implementation and utilization are not functions specifically addressed by this survey, the data are not [illegible] to be in a form that will be immediately useful without [illegible] disaggregation and examination of supplemental backup material, if this is even possible. In all likelihood, new data will need to be collected to answer questions about implementaion/utilization services provided and received. Without such information, we will be developing innovation policy in the dark, without an awareness of what structures and capabilities already exist in the educational R/D&I system to be strengthened and expanded.

C. Needed Studies

Throughout this chapter, we have tried to pinpoint a number of significant questions that will require at least partial anssers before we will be able to design sound policies to strengthen and support the implementation and utilization functions. In concluding this chapter, it seems important for us to suggest some needed research initiatives to explore some of these questions and develop a stronger knowledge and technology base to support these critical innovation functions.

At the very least, there appear to be four areas in which some conceptual work and a good deal of empirical work are needed: (a) understanding the processes involved in successful implementation of various types of change forms (adopting or adapting externally developed R&D outcomes, adopting or adapting exemplary practices, using internally developed information and resources to solve a particular problem, and developing internal resources to facilitate change); (b) developing a clear sense of the range of variability in operational settings that is relevant to different implementation requirements, the relative significance of motivational vs. technical problems for different types of change efforts, and the opportunities that can be capitalized on to promote change in practice settings as well as the barriers to such changes; (c) determining the range of existing and hypothetically possible organizational arrangements to support implementation/utilization and change efforts; and (d) determining the types of change support roles needed and the training requirements and other supports needed for effective functioning in these roles. We consider each of these briefly in turn.

a. Types of Change Forms

There are clearly different implementation requirements involved when a school system is adopting or adapting an externally developed R&D output, on the one hand, or an exemplary practice, on the other. Both represent change forms in which the source of the change comes from outside the given school system. But there is a greater likelihood of extensive packaging of the new program or practice in the case of the R&D output than the exemplary practice. There is also greater likelihood that the developers ~~of~~ the R&D output will provide printed implementation supports and even implementation support personnel. In the case of exemplary practices, the likelihood is that at best the adopting school system may be able to see the practice in operation in one or more demonstration sites, speak with its developers and perhaps others who have used the practice, and perhaps, too, be proveded with validation information and perhaps some materials for use in the implementation effort. But in the case of the exemplary practice, far more of an effort is likely to be required to understand the innovation, how it works, and what is likely to make it a success. We know relatively little about the implementation requirements of these different types of outputs. And regardless of whether the output is ~~an externally~~ developed R&D output or an exemplary practice, where an extensive amount of "mutual adaptation" is likely to occur, we need to develop a much better understanding than we have now about the kinds of adaptations likely for different types of innovations in different kinds of institutional settings. Clearly, then, we need well funded, carefully documented analyses to develop a clear understanding of the kinds of implementation/utilization requirements to be planned for and the sorts of implementation/utilization supports that need to be developed.

We also need to know much more than we do now about the processes of local problem-solving and developing self-renewal capacities. There is likely to be considerable overlap between the two but also some areas that are clearly distinct, for it takes considerably more effort to develop totally self-directed renewal capacities than simply to bring in a consultant to help a district solve a particular problem. A good deal of conseptual work has already been done on various models of change processes. But the field needs to arrive at some consensus on the key points of difference among these models and the most important processes to be studies. What seems to be called for then, would be careful documentation and analysis of these various models in operation and what sorts of change agent roles and other supports are needed to effectively solve problems and develop needed capacities.

Given the range of change-oriented programs that are federally funded, it should be possible to build into existing initiatives a requirement for third-party documentation and analysis, to be carried out by a critical mass of talent in this emerging new area -- either an existing critical mass of talent or, more likely, one that needs to be developed, as a high priority in federal support of educational R/D&I.

b. Range of Operational Settings

In an interesting analysis of the extent of federal influence in education, Michael Kirst argued that most large scale federal educational programs are oriented toward promoting innovation or change, but relatively little real change is discernible because the federal money is filtered through layers and layers of rigid state and local educational structures which resist the changes being promoted. Thus the force of this money is largely diluted by the time it reaches the classroom level.[94]

Part of the explanation for limited change, then, may be located at the policy level, where decisions are made on how to spend the federal funds. The decisions that are made often resist the intent of the federal programs or so distribute the allocated funds that it becomes impossible to focus needed resources in a way that is likely to achieve the intended outcomes.

But there is also another part of the explanation, located at the school and classroom level. Here we are referring to the technical problems encountered in implementing innovations. Most school personnel may simply lack the skills and capacities to make the required changes. In a fascinating analysis of educational practice as a craft, David Cohen focused on the experiential basis of craft knowledge. The basic premise of his argument is that "educational practice turns principally on experiential knowledge and trained judgment" that can best be passed on from master teachers to apprentices thorugh various arrangements in the practice setting and not through national diffusion systems geared to disseminating information and products. Cohen argued that this type of experiential knowledge is organized around critical areas of judgment required for effective practice, that such knowledge can be generated only in the practice setting, and that therefore reform depends "primarily upon the improvement of experiential knowledge and judgment among practitioners by improving the settings and supports which assist the generation of such knowledge -- in the work setting itself."[95] In short, he was arguing for developing internal school system capacities -- both the capacities that define effective practice and the capacities needed by school systems to direct their own self-improvement practice.

If Cohen is correct, this suggest the need to develop an understanding of what those "critical areas of judgment" are and what kinds of organizational arrangements and supports promote the generation and refinement of experiential knowledge in these areas. This will be possible only through support of practice-based research focused on these questions.

Once we develop answers to these questions, we may be in a better position to analyze the implementation requirements of given innovations in terms of the kinds of experiential knowledge that need to be developed for effective implementation of these innovations, we may also be in a better position to understand why some school systems are more effective in implementing innovations. Is it that their personnel have experience, skill, and well developed judgment in areas relevant to given innovations? Is it that these school systems have the kinds of organizational arrangements and supports that permit this kind of craft knowledge to be generated, refined, and passed on from teacher to teacher?

Of course, there are likely to be other key factors as well that warrant some investigation. For instance, the innovation literature suggests that innovation flourishes in settings characterized by: organizational attitudes that support change (free communication, high morale, support from administrators and colleagues); clarity of goal structures; organizational structures that favor innovation (e.g., decentralization of authority, large numbers of occupational specializations, structures for self-renewal); professionalism of the staff; organizational autonomy (i.e., the opposite of organizational "vulnerability"); and few strong vested interests in preserving the status quo.[96]

We will need to do considerably more practice-based research to determine: what factors are most significant in affecting implementation requirements for different types of outputs or change efforts, the relative importance of motivational vs. technical problems, the kinds of opportunities that exist to be capitalized on in support of change, and, especially, what factors are most critical in distinguishing innovative from non-innovative districts, "pace-setters" and "selective" districts from the "faddist" districts, and all of these more innovative types from the non-innovative "backward" districts.[97] If NIE does conduct the survey of practice that has been indicated in some of the Institute's planning documents,[98] these matters would seem to warrant priority attention in the survey design.

c. Range of Organizational Arrangements and Supports

There is already a good deal of survey information about the spectrum of organizational arrangements that exist to support implementation/utilization and change efforts,[99] and more such information should become available from NIE's R&D Utilization Program, the organizational survey undertaken as part of NIE's Education KPU Monitoring Program and the NIE survey of practices (if this latter survey is conducted).

What would seem essentail as a next step, though, would be documentation and analysis of the key factors that account for success or failure in each of these organizational forms and also, perhaps, a collaborative brainstorming effort by key leaders in the field to arrive at other, hypothetically possible and feasible arrangements or supports that would seem to be needed but not yet found in operational settings.

d. Change Roles and Training Requirements

Finally, given the limited personnel base that exists to carry out implementation/utilization or change support activities, it would seem essential to elaborate: (a) the range of roles called for by the existing (and perhaps, too, the hypothetically possible and feasible) organizational arrangements and supports, and (b) the training requirements for these roles. Development of the needed training programs would then seem to be a high priority item, especially if these programs can be developed in practice settings by highly effective implementation/utilization support and change agent personnel, using clinical approaches to training, that can be documented and analyzed to facilitate the development of similar programs elsewhere.

4. Conclusions

There is overwhelming evidence that the processes carried out in the practice setting - either to implement and use externally developed programs or practices, or to develop local solutions to problems -- are critical in accounting for the outcomes of the whole innovation process. Clearly, then, investing heavily in the various other functions of the innovation process while neglecting implementation/utilization and change support processes within schools may mean that the substantial investment already made in educational innovation will not bear fruit in producing the intended educational improvement.

Federal policy has begun to take cognizance of this. But, clearly, considerably more needs to be done, and considerably more first-rate policy thinking needs to be directed at strengthening and expanding these key functions in educational R/D&I.

FOOTNOTES

1. For instance, see: David K. Cohen, "Politics and Research: Evaluation of Social Action Programs in Education," Review of Educational Research, Vol. 40, 1970; John Pincus, "Incentives for Innovation in the Public Schools," Review of Educational Research, Vol. 44, No. 1, Winter 1974.

2. As just one example, see DHEW, Office of Education, "Advance Procurement Information," November 11, 1975, description of future study to be conducted entitled "Assessment of the Implementation of the National Reading Improvement Program."

3. Particularly important on this point are the publications produced as output by the Rand Corporation's Change Agent Study for the U.S. Office of Education. See Paul Berman and Milbrey Wallin McLaughlin, Federal Programs Supporting Educational Change, Vol. I: A Model of Educational Change (Santa Monica: Rand Corporation, 1974); Paul Berman and Edward W. Pauly, Federal Programs Supporting Educational Change, Vol. II: Factors Affecting Change Agent Projects (Santa Monica: Rand Corporation, 1975); Peter W. Greenwood, Dale Mann, and Milbrey Wallin McLaughlin, Federal Programs Supporting Educational Change, Vol. III: The Process of Change (Santa Monica: Rand Corporation, 1975); Paul Berman and Milbrey Wallin McLaughlin, Federal Programs Supporting Educational Change, Vol. IV: The Findings in Review (Santa Monica: Rand Corporation, 1975); and Milbrey Wallin McLaughlin and Paul Berman, Macro and Micro Implementation, paper prepared for IMTEC Training Course held in the Federal Republic of Germany, June 1975, issued in the Rand Paper Series (Santa Monica, Rand Corporation, 1975).

4. For instance, see: James Welch, "Renewal: The Latest Word," Educational Researcher, Volume 1, No. 2, February 1972; Marc Tucker, Mary Harahan, Berlin Kelly, Ward Mason, and Saul Yanofsky, Building Capacity for Renewal and Reform: An Initial Report on Knowledge Production and Utilization in Education (Washington: National Institute of Education; 1973), ERIC ED 087 095; National Institute of Education, Program Plan, May 1975: School Capacity for Problem Solving (Washington: NIE, 1975); Mathew B. Miles and Dale Lake, "Self Renewal in School Systems: A Strategy for Planned Change," in Concepts for Social Change, G. Watson, ed. (Washington: National Training Laboratory, Institute for Applied Behavioral Science, 1967); Mathew B. Miles, The Teacher Center: Educational Change Through Teacher Development (Syracuse: Syracuse University Research Corporation, 1973); Richard A. Schmuck and Mathew B. Miles, Organization Development in Schools (Palo Alto: Mayfield Publishing Co., 1971); Richard A. Schmuck, Philip J. Runkel, S. L. Saturen, R. T. Martell, and C. B. Derr, Handbook of Organization Development in Schools (Palo Alto: Mayfield Publishing Co., 1972); and Stephen H. Wilson, "Explorations of the Concept of Local Capacity for Problem Solving: An Introduction to

a Series of Papers Analyzing Nine School Improvement Projects" and other papers produced as output of NIE's Documentation and Technical Assistance in Urban Schools Project (Chicago: Center for New Schools, 1977).

5. A particularly useful recent study on groups that provide technical assistance is: Center for New Schools, Assistance Strategies of Six Groups that Facilitate Educational Change at the School/Community Level (Chicago: Center for New Schools, 1977).

6. A good example of this literature is: Seymour B. Sarason, The Culture of the School and the Problem of Change (Boston: Allyn and Bacon, 1971).

7. For this argument, see especially David K. Cohen, Ideas and Action: Social Science and Craft in Educational Practice (Cambridge: Harvard University Graduate School of Education, 1977), Draft Manuscript.

8. See our earlier chapter in this volume "Environmental Influences on the Educational R/D&I System."

9. The thinking presented in this volume has evolved over a 4-year period, and various chapters have been drafted at various points in time, from 1975 through 1978. This chapter is one that was drafted in 1978 and reflects the fact that by 1978 we, along with many of our colleagues in the educational R/D&I community, had come to focus more and more of our attention on the operating system's role in educational innovation. In a subsequent draft of this volume, we intend to give more attention to the operating system in all chapters. Consequently, much of the material presented in this chapter draft may be shifted to earlier chapters, especially the chapter on the environment of the educational R/D&I system.

10. Michael Radnor, Harriet Spivak, and Durward Hofler, Research, Development and Innovation: Contextual Analysis (Evanston: Center for the Interdisciplinary Study of Science and Technology, Northwestern University, 1977), Part Three, p. 641.

11. Ibid.

12. For instance, see: J. Victor Baldridge, "Organizational Change: Political Systems versus Human Relations Strategies," Educational Researcher, Vol. 1, No. 1, February 1972; and Harold J. Leavitt, "Applied Organizational Change in Industry: Structural, Technological, and Humanistic Approaches," in Handbook of Organizations, James G. March, ed. (Chicago: Rand McNally, 1965).

13. For instance, see: Warren G. Bennis, Kenneth D. Benne, and Robert Chin, eds. The Planning of Change, Readings in the Applied Behavioral

Sciences, First Edition (New York: Holt, Rinehart and Winston, 1961); Warren G. Bennis, Changing Organizations (New York: McGraw Hill, 1966); Warren G. Bennis, Kenneth D. Benne, and Robert Chin, eds., The Planning of Change Second Edition (New York: Holt, Rinehart and Winston, 1969); Richard I. Evans and Peter K. Leppman, Resistance to Innovation in Higher Education: A Social-Psychological Exploration Focused on Television and the Establishment (San Francisco: Jossey-Bass, 1967); and Ronald Lippitt, Jeanne Watson, and Bruce Westley, The Dynamics of Planned Change: A Comparative Study of Principles and Techniques (New York: Harcourt, Brace and World, 1958).

14. J. Victor Baldridge, Organizational Change Processes: A Bibliography with Commentary (Stanford: Stanford Center for Research and Development in Teaching, Stanford University, 1970), ERIC ED 036 908; Elizabeth A. Campbell, Mary C. Havelock, Ronald G. Havelock, Janet C. Huber, and Shaindel Zimmerman, Major Works on Change in Education: An Annotated Bibliography (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1969); Ronald G. Havelock, with A. Guskin, Bibliography on Knowledge Utilization and Dissemination (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1969); Norman D. Kurland and Richard I. Miller, Selected and Annotated Bibliography on the Process of Change (Albany: New York State Education Department, 1966); Louise M. Maguire, Sanford Temkin, and C. Peter Cummings, An Annotated Bibliography of the Literature on Change (Philadelphia: Research for Better Schools, 1970); Gail J. Skelton and J. W. Hensel, A Selected Annotated Bibliography: The Change Process in Education (Columbus, Ohio: ERIC Clearinghouse on Vocational and Technical Education, Center for Vocational and Technical Education, Ohio State University, 1970); M. Stuart and C. Dudley, Bibliography on Organization and Innovation (Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1968), ERIC ED 019 722; and Sanford Temkin, An Evaluation of the Literature of Comprehensive Planning: with an Annotated Bibliography (Philadelphia: Research for Better Schools, 1970).

15. Robert Chin and Loren Downey, "Changing Change: Innovating a Discipline," in Second Handbook of Research on Teaching, Robert M. W. Travers, ed. (Chicago: Rand McNally, 1973); Joseph Giacquinta, "The Process of Organizational Change in Schools," in Review of Research in Education, Volume 1, Fred N. Kerlinger, ed. (Itasca, Ill.: F. E. Peacock, 1973); Ronald G. Havelock, with Alan Guskin, Mark Frohman, Mary Havelock, Marjorie Hill and Janet Huber, Planning for Innovation through Dissemination and Utilization of Knowledge (Ann Arbor: Center for Research on the Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1969), ERIC ED 056 259; and Louis M. Maguire, Observations and Analysis of the Literature on Change (Philadelphia: Research for Better Schools, 1970).

16. For instance, see: Charles Bidwell, "The School as a Formal Organization," in Handbook of Organizations, James March, ed. (Chicago: Rand McNally, 1965); W. W. Charters, "The Social Background of Teaching," in Handbook of Research on Teaching, N. C. Gage, ed. (Chicago: Rand McNally, 1963); Jacob W. Getzels and P. W. Jackson, "The Teacher's Personality and Characteristics," in Handbook of Research on Teaching, Gage, ed., op. cit.; Jacob W. Getzels, "Social Psychology of Education," in Handbook of Social Psychology, Vol. 5, Gardner Lindzey and Elliot Aronson, eds. (Reading, Mass.: Addison-Wesley, 1968); Robert Dreeben, The Nature of Teaching: Schools and the Work of Teachers (Glenview, Ill.: Scott Foresman, 1970; Philip W. Jackson, Life in Classrooms (New York: Holt, Rinehart and Winston, 1968); Dan C. Lortie, Schoolteacher: A Sociological Study (Chicago: University of Chicago Press, 1975); Ronald Corwin, A Sociology of Education: Emerging Patterns of Class, Status, and Power in the Public Schools (New York: Appleton-Century-Crofts, 1965); Ronald Corwin with Willard Lane, Foundations of Administration in Education: The Behavioral Setting (New York: Macmillan, 1967); Ronald Corwin, "The School as a Formal Organization," Encyclopedia of Education (New York: Macmillan, 1971); James Fennessey and Mary Sexton McDill, "Elementary Schools as a Social System," Encyclopedia of Education (New York: Macmillan, 1971); Richard O. Carlson, "Barriers to Change in Public Schools," in Change Processes in the Public Schools (Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1965); and Sam D. Sieber, "Organizational Influences on Innovative Roles," in Knowledge Production and Utilization in Educational Administration, T. L. Eidell and J. M. Kitchel, eds. (Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1968).

17. For instance, see: Neal Gross, Joseph B. Giacquinta and Marilyn Bernstein, Implementing Organizational Innovations: A Sociological Analysis of Planned Educational Change (New York: Basic Books, 1971); L. M. Smith and P. M. Keith, Anatomy of Educational Innovation (New York: Wiley, 1971); Sarason, The Culture of the School, op. cit.; and the publications produced as output by the Rand Corporation's Change Agent Study, cited above in footnote 3.

18. See especially Sarason, The Culture of the School, op. cit.

19. For instance, see surveys reported in: John Lindeman et al., Some Aspects of Educational Research and Development in the United States -- Report for the OECD Review, Final Report (Syracuse: Syracuse University Research Corp., 1968); Office of Education, Educational Research and Development in the United States (Washington: OE, 1969); and Ronald G. Havelock and Mary C. Havelock, Educational Innovation in the United States (Ann Arbor: Center for Research on the Utilization of Sicentific Knowledge, Institute for Social Research, University of Michigan, 1973). Also important in this category is an examination of classrooms where innovations were reported as being used, but observation indicated the innovations disappeared during implementa-

tion: John I. Goodlad, M. Frances Klein, et al., Behind the Classroom Door (Worthington, Ohio: Charles A. Jones Publishing Co., 1970).

20. Berman and McLaughlin, Federal Programs Supporting Educational Change, Vol. I:, A Model of Educational Change, op. cit.

21. Especially important here are: Goodlad et al., Behind the Classroom Door, op. cit.; Gross, Giacquinta, and Bernstein, Implementing Organizational Innovations, op. cit.; Smith and Keith, Anatomy of Educational Innovations, op. cit.; and Sarason, The Culture of the School, op. cit.

22. For more on this, see especially Miles, The Teacher Center, op. cit. and Matilda Butler-Paisley, William Paisley et al., Communication for Change in Education: Educational Linkage Programs in the 1970's (Stanford: Institute for Communication Research, Stanford University, 1975).

23. See especially Center for New Schools, Assistance Strategies of Six Groups That Facilitate Educational Change at the School/Community Level, op. cit. See both the case studies described in Volume I and the comparative analysis presented in Volume II. Also see descriptions of technical assistance groups in a number of projects that have been studied by the Center for New Schools, cited as follows: Rural Education Program, Basic Program Plans (Portland: Northwest Regional Educational Laboratory, 1972); Wendy Gollub, Affective Education Development Program: Research Report, 1970-71 (Philadelphia: Public Schools, 1971), Mimeo; Anne M. Busis and Edward A. Chittenden, Analysis of an Approach to Open Education: Interim Report (Princeton: Educational Testing Service, 1970); National School Public Relations Association, Individually Guided Education and the Multiunit School (Arlington, Virginia: The Association, 1972); Superintendent of Public Instruction, School-Community Assistance Process: An Overview (Helena, Montana: Author, 1972); Manford L. Holmes, An Examination of Two Technical Assistance Styles Within One Project (Chicago: Documentation and Technical Assistance in Urban Schools, Center for New Schools, 1977).

24. See the sources cited above in footnote 4. Also, the AERA annual meeting programs for every year as far back as at least 1973 show several sessions each year devoted to OD topics - paper sessions, discussions, symposia, and critique sessions.

25. For instance, see National Institute of Education, RFP for Studies in the Utilization of R&D in Education (Washington: NIE, 1976), RFP NIE-R-76-0006; and see especially Linda J. York, Arrangements and Training for Effective Use of Educational R&D Information: A Literature Survey (Berkeley: Far West Laboratory for Educational Research and Development, 1968).

26. For instance, see Butler-Paisley, Paisley, et al., Communication for Change in Education, op. cit.

27. See especially: Ronald G. Havelock, The Change Agent's Guide to Innovation in Education (Englewood Cliffs, New Jersey: Educational Technology Publications, 1973); and Ronald G. Havelock, Training for Change Agents: A Guide to the Design of Training Programs in Education and Other Fields (Ann Arbor: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1971), ERIC ED 056 259.

28. Ronald Lippitt, "The Use of Social Research to Improve Social Practice," in The Oregon Studies in Research, Development, Diffusion and Evaluation, Vol. II: The Literature of Educational RDD&E, Bette C. Porter, ed. (Monmouth, Oregon: Teaching Research Division, Oregon State System of Higher Education, 1972).

29. Pincus, "Incentives for Innovation in the Public Schools," op. cit.

30. For instance, see: Lindeman et al., Some Aspects of Educational Research and Development in the United States, op. cit.; also OE, Educational Research and Development in the United States, op. cit.

31. Of course, others have concluded just the opposite, i.e., that the rate of change in schools has been "glacial." For instance, see: Paul R. Mort, "Studies in Educational Innovation from the Institute of Administrative Research: An Overview," in Innovation in Education, Matthew B. Miles, ed. (New York: Bureau of Publications, Teachers College, Columbia University, 1964).

32. Goodlad, Lein et al., Behind The Classroom Door, op. cit.

33. The best single source on this is Sarason, The Culture of the School, op. cit. Other good sources on this include: Gross, Giacquinta, and Bernstein, Implementing Organizational Innovations, op. cit.; and the Rand Study cited earlier in footnote 3.

34. See our chapter on the development function in educational R/D&I.

35. See the Rand Study, especially Berman and McLaughlin, Federal Programs Supporting Educational Change, Vol. IV: The Findings in Review, op. cit.

36. See references cited above in footnote 3.

37. McLaughlin and Berman, Macro and Micro Implementation, op. cit., pp. 5-6.

38. Pincus, "Incentives for Innovation in the Public Schools," op. cit.

39. See especially Wilson, Explorations of the Concept of Local Capacity for Problem Solving, op. cit.

40. Pincus, "Incentives for Innovation in the Public Schools," op. cit.

41. This discussion draws heavily on: Carlson, "Barriers to Change in Public Schools," op. cit.; Pincus, "Incentives for Innovation in the Public Schools," op. cit.; and Sieber, "Organizational Influences on Innovative Roles," op. cit.

42. Carlson, "Barriers to Change in Public Schools," op. cit., pp. 6-7.

43. See our chapter on environmental influences on educational R/D&I.

44. Sieber, "Organizational Influences on Innovative Roles," op. cit.; Pincus, "Incentives for Innovation in the Public Schools," op. cit. and Matthew B. Miles, "Educational Innovation: The Nature of the Problem," in Innovation in Education, Miles, ed., op. cit., p. 40.

45. Some sense of the multiplicity of educational goals can be developed from glancing through Benjamin S. Bloom, Taxonomy of Educational Objectives: The Classification of Educational Goals (New York: Longmans, Green and Co., 1956).

46. Most notably, see: Christopher Jencks et al., Inequality: A Reassessment of the Effect of Family and Schooling in America (New York: Basic Books, 1972); James S. Coleman et al., Equality of Educational Opportunity (Washington: U. S. Government Printing Office, 1969). There is also a sizeable literature on the influences of SES background, of peers, of television and other communication media, etc.

47. Sieber, "Organizational Influences on Innovative Roles," op. cit.

48. Ibid. The concepts come form Sieber. We have added the examples.

49. See especially: Corwin, A Sociology of Education, op. cit.; Corwin and Lane, Foundations of Administration in Education, op. cit.; Corwin "The School as a Formal Organization," op. cit.; and Bidwell, "The School as a Formal Organization," op. cit.

50. Ibid.; also see Sieber, "Organizational Influences on Innovative Roles," op. cit.; Art Gallaher, Jr., "Directed Change in Formal Organizations: The School System," in Carlson et al., Change Processes in the Public Schools, op. cit.; Sloan R. Wayland, "Structural Features of American Education as Basic Factors in Innovation," in Innovation in Education, Miles, ed., op. cit.

51. See, for instance: Sarason, The Culture of the School, op. cit. On the consequences of this for innovation, see: Daryl Hobbs, "Facilitating the Change Process in Agricultural Education," in The Oregon Studies, Vol. II, Porter, ed., op. cit.; and Mort, "Studies in Educational Innovation from the Institute of Administrative Research," op. cit.

52. This pattern is not quite as prevalent as it used to be now that there is more team teaching, cluster teaching, teaming of several professionals together in large "open classrooms," use of paraprofessionals and aides, etc. Still, the single teacher in the self-contained classroom remains the predominant pattern.

53. Sarason, The Culture of the School, op. cit.

54. Wayland, "Structural Features of American Education as Basic Factors in Innovation," op. cit.

55. For instance, see: Matthew Miles, "A Matter of Linkage: How Can Innovation Research and Innovation Practice Influence Each Other?" in What Do Research Findings Say About Getting Innovations Into Schools: A Symposium, Sanford Temkin and Mary V. Brown, eds. (Philadelphia: Research for Better Schools, 1974); also see COPED (Cooperative Project for Educational Development), Final Report, COPED Data Analysis Project, Project No. 8-0069. OEG-3-8-080069-0043 (010). (Washington: Office of Education, 1970), Vol. I, Research Outcomes; Vol. 2, Case Studies; Vol. III, Diagnosing the Professional Climate of Your School; Appendix: Instruments and Code Manual.

56. See our chapter on information flows.

57. For instance, see: Sarason, The Culture of the School, op. cit.; Roland J. Pellegrin, An Analysis of Sources and Processes of Innovation in Education (Eugene, Oregon: Center for the Advanced Study of Educational Administration, University of Oregon, 1966).

58. Miles, "A Matter of Linkage," op. cit.

59. Carlson, "Barriers to Change in Public Schools," op. cit.

60. For instance, see Ronald G. Corwin, "Strategies for Organizational Innovation: An Empirical Comparison," American Sociological Review, Vol. 37, August 1972).

61. For instance, see: Lindeman et al., Some Aspects of Educational Research and Development in the United States, op. cit.; OE, Educational Research and Development in the United States, op. cit.; J. Victor Baldridge and Robert Burnham, The Adoption of Innovations: The Effect of Organizational Size, Differentiation, and Environment (Stanford: Stanford Center for Research and Development in Teaching, 1973); and J. Victor Baldridge, "Political and Structural Protection of Educational Innovation," in What Do Research Findings Say About Getting Innovations into Schools, Temkin and Brown, eds., op. cit.

62. G. Zaltman, R. Duncan, and J. Holbek, Innovations and Organizations (New York: John Wiley, 1973).

63. Daniel E. Griffiths, "Administrative Theory and Change in Organizations," in Innovation in Education, Miles, ed., op. cit.

64. Pincus, "Incentives for Innovation in the Public Schools," op. cit.

65. Margaret K. Nelson and Sam D. Sieber, Innovations in Urban Secondary Schools (New York: Bureau of applied Social research, Columbia University, 1975).

66. Neal Gross, Joseph B. Giacquinta, and Marilyn Bernstein, An Attempt to Implement a Major Educational Innovation: A Sociological Inquiry (Cambridge: Center for Research and Development on Educational Differences, Harvard University, 1968), ERIC ED 032 649; Gross, Giacquinta and Bernstein, Implementing Organizational Innovations, op. cit.

67. Sarason, The Culture of the School, op. cit.

68. See above in this chapter, Section II.2.B.a. iii.

69. See the references cited above in footnote 3.

70. Ibid., Vol. 4: The Findings in Review, op. cit.

71. Ibid.

72. See our chapter on the dissemination function in educational R/D&I.

73. Butler-Paisley, Paisley, et al., Communication for Change in Education, op. cit.

74. NIE, Program Plan, May 1975: School Capacity for Problem Solving, op. cit.

75. Ibid.

76. Donald R. Moore, Emile M. Schepers, Manford L. Holmes, and Kathy A. Blair, Listing of Groups that Facilitate Educational Change at the School/Community Level (Chicago: Center for New Schools, 1977) Of the 78 groups listed, some would fall into other, more specific categories in the scheme we are using (for instance, teacher centers). Still, the substantial number of organizations listed suggests that a significant amount of assistance and support is being provided, in one form or another, to support educational change at the local level.

77. Center for New Schools, Assistance Strategies of Six Groups that Facilitate Educational Change at the School/Community Level, op. cit.

78. On technical assistance, in particular, a document produced by the DTA project was: Manford L. Holmes, An Examination of Two Technical Assistance Styles Within One Project (Chicago: Documentation and Technical Assistance in Urban Schools Project, Center for New Schools, 1977).

79. NIE, RFP for Studies in Utilization of R&D in Education, op. cit.

80. NIE, Program Plan, May 1975: School Capacity for Problem-Solving, op. cit.

81. Lippit, "The Use of Social Research to Improve Social Practice," op. cit.

82. Ibid., p. 795

83. The change agent models described in the literature vary from the more passive dissemination/information consultant roles to more active utilization roles. For instance, see: Bela H. Banathy et al. The Educational Information Consultant: Skills in Disseminating Educational Information (Berkeley: Far West Laboratory for Educational Research and Development, 1972), ERIC ED 071 689; Gerald W. Marker and Howard D. Mehlinger, Report of the Social Studies Field Agent Training Program, Final Report (Bloomington: Indiana University Foundation, 1972), ERIC ED 076 463; Roger Rasmussen, The Product as Change Agent: Advantages and Limitations (Dayton, Ohio: Institute for Development of Educational Activities, 1972), ERIC ED 063 550; Mark Chesler et al., The Educational Change Team: An Effort to Develop a National Facility to Generate and Implement Information and Resources Relevant to Secondary School Crisis and Change. Final Report (Ann Arbor: School of Education, University of Michigan, 1972), ERIC ED 087 644; Kenneth P. Lindsay, Research Information for the Educator to Meet the Educational Needs of Utah's Children: Technical Assistance Information Service. Interim Report (Salt Lake City: Utah State Board of Education, 1972), ERIC ED 069 327; York, Arrangements and Training for Effective Use of Educational R&D Information, op. cit.; and Public Schools of the District of Columbia, Reading Research Utilization Project. Interim Report (Washington: Public School System, 1972) ERIC ED 069 281.

84. For instnace, see the sources cited above in footnotes 12-15, but also, more directly on change agents: Ronald G. Havelock, Training for Change Agents. A Guide to the Design of Training Programs in Education and Other Fields (Ann Arbor: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1971), ERIC ED 056 259; Colin Mick et al., Development of Training Resources for Educational Extension Services Personnel, Vol. 1: Final Report (Stanford: Institute for Communication Research, Stanford University, and Santa Monica: System Development Corporation, 1973) ERIC ED 077 534; J. Todd Simonds and Theodora St. Lawrence, Methodological and Theoretical Bases for Designing Local Educational Change Programs (Pittsburgh: Learning Research and Development Center, University of Pittsburgh, 1972), Paper Presented at the Annual Meeting of the American Educational Research Association, Chicago, April 1972, ERIC ED 063 679; and Fred S. Rosenau, Tactics for the Educational Change Agent: A Preliminary Analysis (San Francisco: Far West Laboratory for Educational Research and Development, 1974), ERIC ED 096 258.

85. For instance, see: Mick et al., Development of Training Resources for Educational Extension Services Personnel, op. cit., Volume 2: Trainers'

Book, ERIC ED 077 535 and Volume 3: Trainees' Book, ERIC ED 077 536, and Ronald G. Havelock, The Change Agent's Guide to Innovation in Education (Englewood Cliffs, New Jersey: Educational Technology Publication, 1973).

86. Center for New Schools, Assistance Strategies of Six Groups That Facilitate Educational Change at the School/Community Level, op. cit.

87. Havelock, Training for Change Agents, op. cit.

88. Center for New Schools, Assistance Strategies of Six Groups That Facilitate Educational Change, op. cit.

89. Havelock, Planning for Innovation Through Dissemination and Utilization of Scientific Knowledge, op. cit.

90. Center for New Schools, Assistance Strategies of Six Groups That Facilitate Educational Change, op. cit., Final Report Summary, p. 24 and Appendix.

91. Flora Young, Process Analysis and Documentation for Utilization of Research Findings (Portland, Oregon: Northwest Regional Educational Laboratory, 1973), ERIC ED 087 709.

92. The Documentation and Technical Assistance in Urban Schools Program which we have referred to before is a notable example of this failure.

93. Two good examples are The Oregon Studies in Research, Development, Dissemination, and Evaluation, Volumes I, IV, and V (Monmouth, Oregon: Teaching Research Division, Oregon State System of Higher Education, 1972); and Center for New Schools, Assistance Strategies of Six Groups That Facilitate Educational Change, op. cit.

94. Michael W. Kirst, "The Growth of Federal Influence in Education," in National Society for the Study of Education Yearbook (Chicago: NSSE, 1974).

95. Cohen, Ideas and Action, op. cit.

96. These factors were identified by Pincus from his review of the relevant literature as described in: Pincus, "Incentives for Innovation in the Public Schools," op. cit.

97. This four-fold distinction is from Nelson and Sieber, Innovation in Urban Secondary Schools, op. cit.

98. National Institute of Education, Preliminary Program Plans, FY 78. Executive Summary (Washington: NIE, July 1976); and National Institute of Education, Dissemination and Resources Group: Program Plan, FY 1978 (Washington: NIE, August 1976).

99. Butler-Paisley, Paisley, et. al., Communication for Change in Education op. cit.; and York, Arrangements and Training for Effective Use of Educational R&D Information, op. cit.

EDUCATIONAL RESEARCH, DEVELOPMENT,

AND INNOVATION: THE INSTITUTIONALIZATION

OF CHANGE IN EDUCATION

CHAPTER FIFTEEN

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CHAPTER FIFTEEN

THE EVALUATION FUNCTION

THE EVALUATION FUNCTION

I. THE HISTORICAL CONTEXT

Evaluation of educational programs is hardly new. But evaluation emerged as a specialized R/D&I function, with a specialized institutional and personnel base and a distinctive methodology, only with the institutionalization of educational R/D&I in the last decade and a half.

Prior to the mid-'60s, evaluation of educational programs (when it was done at all) was carried out by educational practitioners and by some researchers, but rarely by people who identified themselves as evaluation specialists. The approaches used tended to be normative, but rarely systematic or rigorous. The predominant strategy was casual observation and analysis. Conclusions tended to be based on expert opinion, intuition, and impressions, rather than systematically gathered and rigorously analyzed empirical data.

This pattern changed significantly in the '60s as large-scale federally funded social programs proliferated, and the legislation that created them tended to require the systematic gathering, and reporting of empirical data on program effectiveness. Thus, the evaluation function expanded rapidly as a new specialty, even as a new "industry."[1] In less than a decade between 1965 and 1974, DHEW and Department of Labor evaluation contracts increased from the $5 million to the $50 million level,[2] with the bulk of evaluation funding going to the non-profit and for-profit research corporations which became the dominant performers in this segment of the federal contract economy.[3] Many of these research corporations are sector-spanning institutions, bidding on evaluation contracts not only in education but also in health, manpower training and development, social welfare, and (in the case of some of the more diversified research organizations and management consulting firms) industry, defense, and aerospace as well.

Given this historical context, the expansion and maturation of the evaluation function in education must be viewed as part of the broader development of the field of social program evaluation -- showing the same rapid growth in numbers of evaluators and amounts of evaluation activity; the same growing influence of research corporations competing with universities for evaluation contracts; and the same kinds of attention to methodological, organizational, ~~and~~ political issues inherent in the evaluation role.[4]

II. MATURATION OF THE FIELD'S KNOWLEDGE AND TECHNOLOGY BASE

The early phases of the maturation process of a knowledge and technology base are illustrated with particular clarity in the enormous literature produced by the evaluation function over the last decade and a half. Of all the functional R/D&I specialties, evaluation appears to have experienced the most self-conscious and concerted development of its methodology during this period. The literature reflects not only the inherent difficulties of the evaluation role and evaluation processes, but also the problems of weaning a new specialty away from a parent field. The early literature was filled with self-conscious analyses drawing distinctions between evaluation and research,[5] and emphasizing the inappropriateness of prevailing research methodology for the educational evaluation context.[6] Within only a few years, the distinction from education research was taken for granted, and the literature documented the development of evaluation as a new field with a distinctive identity.

The rapid coming of age of the evaluation function could be seen in the quick succession of seminal papers produced by evaluation theorists,[7] the publication of several anthologies reprinting important articles on evaluation,[8] the frequent citation of the seminal papers of the field and the use of concepts and approaches developed in these papers. It could be seen in the emergence of a somewhat common frame of reference among evaluation theorists and a common vocabulary -- including such terms as "formative" and "summative" evaluation[9] and "context," "input," "product," and "process" evaluation.[10] The maturation of the evaluation function could be seen especially in the formulation of various new evaluation designs and methodologies,[11] in attempts to develop taxonomies of evaluation designs,[12] in the publication of several handbooks synthesizing and compressing the accumulating knowledge and technology base and translating it into more readily usable reference forms,[13] and in the publication of several new evaluation journals.[14]

Still, the conduct of educational evaluation and the quality of evaluation outputs have been the focus of considerable criticism.[15] The field still lacks an adequate theoretical base. Evaluation instrumentation is in a most rudimentary state of development. And basic conceptual and methodological dilemmas remain unresolved.[16] Two centers have been established specifically to advance the state of development of evaluation research theory and methodology, the Center for the Study of the Evaluation of Instructional Programs (one of the federally funded R&D centers) and an evaluation center headed by Danial Stufflebeam at Western Michigan University. In addition, a small measurement division within NIE has been working specifically in the area of strengthening evaluation methodology. As yet, however, despite the considerable energy that has been invested in advancing the state of development of the evaluation function in education, compared to other R/D&I systems the knowledge and technology base of educational evaluation must still be considered relatively weak and immature.

III. INSTITUTIONAL BASE

Federal funding data underscore the extent to which the evaluation function has come to be dominated by the non-profit and for-profit research corporations. For instance, 1971 data for DHEW evaluation contracts (all DHEW work, not education alond) indicate that 74% of these funds went to non-profit and for-profit research corporations, and only 21% to universities or university-affiliated organizations.[17] FY 1975 data for all ~~federal obligations~~ in the area of early childhood and adolescent education suggest that 49% of federal evaluation funding goes to the for-profit corporations, 27% to non-profit corporations, and 21% to academic institutions. The for-profit corporations are heavily dependent on evaluation projects: 77% of their FY 1975 federal funding in education KPU came from evaluation contracts.[18]

It has baen argued that the modes of procuring evaluation work have tended to turn academic researchers away from federally funded evaluation work, often because they feel the designs, instrumentation, etc. suggested in the RFPs are faulty, that alternative proposals are often greeted as "unresponsive," at that at any rate the time frames and political context in which federally funded evaluation work is carried out make it generally unattractive to academic researchers more comfortable with other modes of inquiry.

However, another school of thought on research corporation dominance of federally funded evaluation work is that the research corporations tend to be favored as performers more suited to this kind of work, and that the consequences have been poorer quality evaluation studies than would be the case if more of the work were carried out by academic institutions.[19] The debate has been waged over not only the basic premise but also the validity of the data (and inferences made from the data) on differences between the academic and entrepreneurial modes of evaluation research:

> There is as yet little consensus on the point. Cearly, though, some assessments do need to be made of the quality of the evaluation work carried out by different types of performing institutions and even specific contractors. If evaluation research is ever to have substantial impact on educational policy making, this is clearly not likely until policy makers come to view evaluation studies as providing sound data that can inform the decision process.

IV. PERSONNEL BASE

The evaluation function has expanded so rapidly that evaluators organized themselves into a separate AERA division a few years ago. With approximately 4,000 members, it is already one of AERA's largest divisions.

It is not clear as yet what kinds of formal training these evaluators have had for their specialized roles. Future studies of the personnel base may be able to establish this. (One ready possibility if analyzing the background data available on members of the evaluation division in AERA's demographic data files.) It is likely that most have been trained in standard educational research methodology and have been trying, on their own, or through supports provided by their work groups, to adapt this methodology to the peculiar requirements of program evaluation in the education context, and to absorb what they can from the proliferating literature on new evaluation models and technologies.

Several initiatives have been taken in recent years to try to upgrade the competencies of evaluation specialists. Evaluation research was one of the key functional areas analyzed by AERA's Task Force on Training. As a result of their work, the specific competencies for this kind of work have been analyzed and are available for use in designing new training programs.[20] Some small amount of federal funding has been invested in the design of training programs geared specifically to the requirements for evaluation research in education.[21] Both AERA and Phi Delta Kappa have been conducting training programs and workshops in evaluation skills.[22]

And clearly, some graduate level courses are now appearing focused on evaluation research, separate and apart from general methods courses. But as yet, it is unclear how many programs have been put into operation, of what types, focusing on what competencies; or how many evaluators at work in the field have been exposed to these programs, with what effects; or what other sources (if any) evaluators are using to upgrade their skills and competencies. There is clearly a great deal of empirical and analytical work needed in this area, but few signs as yet that such work is being performed, or even that educational R/D&I sponsors are interested in supporting such investigations.

V. METHODOLOGICAL ISSUES

1. Key Issues Debated in the '60s and early '70s

During the '60s and early '70s, there were many heated debates among evaluation and research theorists about appropriate methodologies for the evaluation function. One group argued that experimental (or quasi-experimental) designs were more powerful than any other research approaches for assessing the effectiveness of programs, products, or strategies -- and that it was therefore essential to use these approches to test R&D outputs and to reform programs of all kinds.[23] A second group argued that experimental approaches imposed unrealistic constraints on field settings -- and that at any rate it could never be possible to meet adequately the statistical, design, and treatment assumptions on which experimental approaches were premised.[24]

Other methodological debates revolved around the need for evaluation approaches to provide feedback throughout the program development process -- not simply telling the developer at the end of the development process that his program did not work, but working with him throughout the process to make it better.[25] Existing pre-post evaluation designs made it difficult for program evaluators to provide this kind of feedback, or to understand how to evaluate a program stimulus that kept changing.

2. Summative vs. Formative Evaluations

Some of these disagreements have been eased by recognition among evaluation specialists that there are a number of different kinds of evaluation services, each requiring somewhat different approaches and techniques. The distinction between formative and summative evaluations represents one such difference. Initially, the same researchers conducted both formative and summative evaluations. Over time, however, there appears to have been some specialization of personnel and organizational units, with some focusing primarily on formative evaluations and others focusing largely on summative assessments.

Currently, the formative evaluations that are undertaken as part of the R&D program/product development process are generally carried out by evaluators who work with developers as part of the development team and provide ongoing feedback designed to improve the product or program being developed. They use both quantitative data-based and qualitative judgmental approaches. Their style of functioning emphasizes flexibility -- changing their research questions, variables, instruments, and approaches as the emerging program takes shape and perhaps goes through a number of transformations.

3. Summative Evaluations: Experimental vs. Non-Experimental Designs

The debate over experimental vs. other kinds of research designs is now centered on summative evaluations -- the evaluations undertaken to test the effectiveness of a given program or product after it has been fully developed. Summative evaluations are usually done by an evaluation organization or organizational unit independent of the program's developers. Summative evaluations include several types of evaluations differing somewhat in emphasis because of the different information needs of the decision makers to whom they are addressed:

1. final operational field tests of an R&D output to help the R/D&I manager determine whether or not it is ready for dissemination;

2. evaluations of the effectiveness of a given program or product in a given school or district in meeting locally defined objectives;

3. evaluations of national program initiatives, sampling program components nationwide to inform federal policymakers about the effectiveness of a given strategy (or the relative effectiveness of alternative strategies) in meeting federally defined policy goals.

There is still some disagreement about how appropriate experimental designs may be for product tests and for individual school or school district program evaluations; and many other kinds of research designs have been proposed for these types of evaluations. Nonetheless, a federal program evaluation policy (to whatever extent such a policy exists) appears to be moving toward experimental approaches -- increasing numbers of national program evaluations are being conducted using experimental designs, control groups, and some randomization of treatments.[26] However, the difference between experimental setting in the laboratory and the field is gaining recognition. Federal evaluators are increasingly acknowledging the need to supplement impact data with process data demonstrating that a given "treatment" was in fact implemented as specified in the program design, and that the impact evaluation is a valid test of the program and not simply a "non-event."[27] Otherwise, questions can readily be raised as to whether a program evaluated as a failure was in fact a failure -- or whether instead it was never even tried (and thus what was evaluated and judged a "failure" did not in reality even resemble the specified program "treatment").

VI. ORGANIZATIONAL AND POLITICAL DILEMMAS

1. The Evaluator's Role

The evaluator's role has come to be understood primarily as one of meeting the information needs of decision makers.[28] However, there are a number of issues and problems involved in this assumption. For example:

Which decision makers are we talking about: implementation personnel? program managers at specific sites? program managers at the local, state and/or federal level? policy makers (and at what level)?

How does the evaluator deal with the difficulty decision makers have in defining their information needs; in agreeing on what information is relevant or in agreeing on what measurement procedures and instruments are valid?

How much input can an evaluator have in defining what he investigates? Must he accept the client's definition of the program's objectives and simply assess the effectiveness of the program in meeting these objectives? Or can he include in his evaluation consideration of the appropriateness of these objectives (or the program's rationale or strategy) for meeting the ultimate goal of the program's developers?

2. The Political Dilemma

Evaluations are often described as management tools designed to provide a "rational basis for decision making" -- but decision makers in the public sector function in a largely political sphere. This fact raises important issues for the evaluator on both theoretical and practical levels.

On the theoretical level, we must ask if political considerations are "irrational," or if they are based on "a different model of rationality" from the one generally used by social scientists.[29]

On the practical level, consideration must be given to the politics of decision making. Generally speaking, programs are created by political coalitions of diverse interests -- interests which support programs for diverse reasons. These coalitions tend to view negative evaluation research findings unfavorably -- and generally have enough influence to modify or bury negative findings and keep their programs going regardless of what evaluators report. Conversely (yet similarly), programs may be opposed by other political interest groups -- interest groups who will use findings of evaluation research to achieve their ends. Thus, evaluation research findings may be used, misused, modified, reinterpreted, buried, etc.[30] -- in other words, used as a "political football." Given the political context and the methodological issues we have noted above, it is not surprising that controversy over negative evaluation research findings are so often phrased in terms of methodological issues rather than evaluation findings per se.

3. The "Values" Dilemma

The educational context is value-laden, and value choices enter virtually every one of the key decisions made by the evaluator. The outcome of evaluation research may be predetermined by the choice of research questions and objectives, the criteria used in judging effectiveness, or the measurement instruments administered. From the perspective, the question must be asked: Is the evaluator value-free when doing evaluation research? From the organizational/political context perspective, the question must be asked: To what extent is/should these key value decision choices of the evaluator be influenced by the organizational information needs of the decision maker on the one hand, and the political context/dynamics on the other hand?

4. Current Trends

Evaluators are developing an increasing sensitivity to the politics of decision making. The evaluation research literature has shown the progress made by the field over time in coping with this situation -- from an early literature that simply bemoaned this situation, to more recent writings that accept it as a given and build consideration ~~of the politics of~~ decision making into the planning and implementation of evaluations to make them more "strategically useful."[31]

The evaluation research function is in a much stronger organizational and political position now than it was a decade ago. Instead of being located in marginal units that could be easily ignored, planning and evaluation units and their administrators are now included in the top management decision structures of federal agencies.[32] The evaluation research function is taking on increasing prominence in the General Accounting Office's auditing activities.[33] On the state level, legislative oversight committees with strong evaluation research staffs of their own have given significant visibility to evaluation research activities and findings.[34]

VII. THE IMPACT OF EVALUATIONS IN EDUCATIONAL DECISION-MAKING

There is still substantial disagreement over just how much impact the evaluation function has had (or can have). But clearly, there is relatively little evidence of extensive use of evaluation research findings as the basis of policy decisions. Equally clearly, relatively few high quality evaluations have been produced and even the better evaluations have suffered from serious methodological flaws.

The evaluation function lacks an adequate theoretical base, and is even more lacking in adequate instrumentation. There is no clear federal evaluation policy, and federal agencies have not even issued guidelines as to what constitutes an adequate or appropriate evaluation. (OE, though, the dominant sponsor of federally funded evaluations,[35] has been moving in this direction and beyond for the evaluation of ESEA Title I programs.)[36] It would seem, then, that the evaluation function in education (and other social program areas) remains weak in comparison to the evaluation function in more mature R/D&I systems.

FOOTNOTES

1. For instance, see: Albert D. Biderman and Laure M. Sharp, The Competitive Evaluation Research Industry (Washington: Bureau of Social Science Research, Inc., 1972); and Ilene N. Bernstein and Howard E. Freeman, Academic and Entrepreneurial Research: The Consequences of Diversity in Federal Evaluation Studies (New York: Russell Sage Foundation, 1975).

2. John W. Evans, "Evaluating Education Programs - Are We Getting Anywhere?" Educational Researcher, Vol. 3, No. 8, September 1974, p. 8.

3. On the evaluation research industry as a whole, see data adapted from James Abert, cited in Biderman and Sharp, The Competitive Evaluation Research Industry, op. cit., p. 23. On evaluation funding for the education sector alone, see Carnot E. Nelson and Ward S. Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency (Washington: R&D System Support Division, NIE, 1977), Tables 15 and 16, pp. 33-34.

4. See the literature that came out of efforts to evaluate social action programs in the "War on Poverty," especially Robert A. Levine, "Evaluating the War on Poverty," and Peter H. Rossi, "Practice, Method, and Theory in Evaluating Social Action Programs," in On Fighting Poverty: Perspectives from Experience, James L. Sundquist, ed. (New York: Basic Books, 1969); Peter H. Rossi and Walter Williams, ed., Evaluating Social Programs: Theory, Practice, and Politics (New York: Seminar Press, 1972); Louis A. Ferman, "Some Perspectives on Evaluating Social Welfare Programs," The Annals of the American Academy, No. 385, September 1969; Robert S. Weiss and Martin Rein, "The Evaluation of Broad-Aim Programs: Difficulties in Experimental Design and an Alternative," Paper presented at the American Academy of Arts and Sciences Conference on Evaluation of Social Action Programs, May 1969; Donald T. Campbell, "Reforms as Experiments," American Psychologist, Vol. 24, No. 4, April 1969, pp. 409-429; Carol H. Weiss, ed., Evaluating Action Programs: Readings in Social Action and Education (Boston: Allyn and Bacon, 1972); and the highly useful articles that have appeared in Evaluation: A Forum for Human Service Decision-Makers since it began publication as a journal in 1973.

5. See especially John K. Hemphill, "The Relationships Between Research and Evaluation Studies," in The Oregon Studies, Vol. II, op. cit.; John K. Hemphill, "Educational Research, Educational Development, and Evaluation Studies," in Hemphill and Rosenau, Educational Development: A New Discipline, op. cit.

6. For instance, see: Egon G. Guba, "Development, Diffusion and Evaluation," in Knowledge Production and Utilization in Educational Administration, T. Eidell and J. Kitchel, eds. (Eugene: Center for the Advanced Study of Educational Administration, 1967), also reprinted in The Oregon Studies, Vol. II, op. cit.; Daniel L. Stufflebeam, "Evaluation as Enlightenment for Decision-Making," in The Oregon Studies, Vol. II, op. cit.;

Robert E. Stake, "The Countenance of Educational Evaluation," Teachers College Record, Vol. 68, No. 7, April 1967, reprinted in The Oregon Studies, Vol. II, op. cit. and in Carol H. Weiss, ed., Evaluating Action Programs: Readings in Social Action and Education (Boston: Allyn and Bacon, 1972).

7. See especially: Micahel Scriven, "The Methodology of Evaluation," in Perspectives of Curriculum Evaluation, R. W. Tyler, R. M. Gagne, and M. Scriven, eds., AERA Monograph Series on Curriculum Evaluation (Chicago: Rand-McNally, 1967), reprinted in The Oregon Studies, Vol. II, op. cit. and in Weiss, Evaluating Action Programs, op. cit.; Stake, "The Countenance of Educational Evaluation," op. cit.; Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.; Donald T. Campbell, "Reforms as Experiments," American Psychologist, Vol. 24, No. 4, April 1969, reprinted in Weiss, Evaluating Action Programs, op. cit.; Robert S. Weiss and Martin Rein, "The Evaluation of Broad-Aim Programs: Difficulties in Experimental Designs and an Alternative," reprinted in Weiss, Evaluating Action Programs, op. cit.

8. For instance: Weiss, Evaluating Action Programs, op. cit; The Oregon Studies, Vol. II, op. cit., Chapter II; Francis G. Caro, ed., Readings in Evaluation Research (New York: Russell Sage Foundation, 1971); and the annual review published each year by Sage Publications of Beverly Hills, Evaluation Studies: Review Annual, Vol. 1, 1976, Gene V. Glass ed.; Vol. 2, 1977, Marcia Guttentag, ed.; Vol. 3, 1978, Thomas D. Cook, ed.

9. Scriven, "The Methodology of Evaluation," op. cit.

10. Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.

11. For instance, see the articles on evaluation made in Scarvia B. Anderson, Samuel Ball, Richard T. Murphy, et al., Encyclopedia of Educational Evaluation: Concepts and Techniques for Evaluating Education and Training Programs (San Francisco: Jossey Bass, 1974); also the articles on evaluation models in Gary D. Borich, ed., Evaluating Educational Programs and Products (Englewood Cliffs: Educational Technology Publications, 1974). Also see: John A. Meskauskas, "Evaluation Models for Criterion-Referenced Testing: Views Regarding Mastery and Standard-Setting," Review of Educational Research, Vol. 46, No. 1, Winter 1976; Stake, "The Countenance of Educational Evaluation," op. cit.; Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.; and the following other pieces from The Oregon Studies, Vol. II, op. cit. Robert S. Randall, "An Operational Application of the CIPP Model for Evaluation;" Peter Crane and Clark C. Abt, "A Model for Curriculum Evaluation," William C. Theimer, Jr., "A Model for Post Hoc Evaluation;" John B. Peper, "Summary of Program Relevance Evaluation Model;" and Esther Kresh, "An Overview of the Discrepancy Evaluation Model and a Related Case Study." Also see: Gene V. Glass, Educational Product Evaluation: A Prototype Format," Educational Researcher, Vol. 1, No. 1, January 1972; Marcia Guttentag, "Subjectivity and Its Use in Evaluation Research," Evaluation, Vol. 1, No. 2, 1973; Daniel L. Stufflebeam,

Walter J. Foley, William J. Gephart, Egon G. Guba, Robert L. Hammond, Howard O. Uherriman and Malcolm Provus (PDK Commission on Evaluation, Educational Evaluation and Decision Making (Itasca, Illinois: F. E. Peacock, 1971); W. James Popham and Dale Carlson, "Deep Dark Deficits of the Adversary Evaluation Model," Educational Researcher, Vol. 6, No. 6, June 1977; David Hamilton, David Jenkins, Christine King, Barry MacDonald, and Malcolm Parlett, Beyond the Numbers Game: A Reader in Educational Evaluation (London: Macmillan Education Ltd., 1977); and M. Provus, Discrepancy Evaluation for Educational Program Improvement and Assessment (Berkeley: McCutchen Publishing, 1971).

12. For instance, see Robert Stake, "Prototypes of Curriculum Evaluation," in The Oregon Studies, Vol II, op. cit.

13. These handbooks include: B. S. Bloom, J. T. Hastings, and G. F. Madaus, Handbook on Formative and Summative Evaluation for Student Learning (New York: McGraw-Hill 1971); Marcia Guttentag and Elmer L. Struening, ed., Handbook of Evaluation Research (Beverly Hills, Sage Publications, 1975); Anderson, Ball, Murphy et al., Encyclopedia of Educational Evaluation, op. cit.; and Borich, Evaluating Educational Programs and Products, op. cit. Another useful synthesis is Edward A. Suchman, Evaluative Research Principles and Practice in Public Service and Social Action Programs (New York: Russell Sage Foundation, 1967); A number of handbook-type reference works have also been published for practitioners, including the following: Lynn Lyons Morris, Carol Tyler Fitz-Gibbon, and Marlene E. Henerson, Program Evaluation Kit (Beverly Hills: Sage Publications, 1978); Bruce W. Tuckman, Evaluating Instructional Programs (Rockleigh, N. J.: Allyn and Bacon, Longwood Division, 1979); and John M. Gottman and Robert E. Clasen, Evaluation in Education: A Practitioner's Guide (Itasca, Illinois: F. E. Peacock, 1972).

14. The evaluation journals include the following: (a) Evaluation, published by the Minneapolis Medical Research Foundation Inc. and the National Institute of Mental Health, beginning in 1972; (b) Evaluation Quarterly, published by Sage Publications, beginning in 1977; (c) Evaluation and the Health Professions, announced by Sage Publications as beginning publication in 1978; and (d) Educational Evaluation and Policy Analysis, a publication approved by the AERA Governing Council late in 1978, to be the newest AERA-sponsored journal.

15. For instance, see Selma J. Mushkin, "Evaluations: Use With Caution," Evaluation, Vol. 1, No. 2, 1973; William L. Speizman, "Evaluation: An Evaluation from a Sociological Perspective," 1974 Yearbook of the National Society for the Study of Education (Chicago: University of Chicago Press, 1974); Egon G. Guba, "The Failure of Educational Evaluation," Educationl Technology, Vol. 9, No. 5, 1969, reprinted in Weiss, Evaluating Action Programs, op. cit.; Carol H. Weiss, "The Politicization of Evaluation Research," in Weiss, Evaluating Action Programs, op. cit.; and "Significant Differences on the Social Insignificance of

Statistical Significance -- A Plea for New Strategies of Evaluation," Educational Researcher (Newsletter), Vol. 20, October 1969.

16. Among the sources useful for gaining an insight into some of these dilemmas, see: R. W. Tyler, ed., Educational Evaluation: New Roles, New Means, 68th Yearbook of the National Society for the Study of Education, Part II (Chicago: University of Chicago Press, 1969), and especially the following articles in this Yearbook: Benjamin S. Bloom, "Some Theoretical Issues Relating to Educational Evaluation," and Robert E. Stake and Terry Denny, "Needed Concepts and Techniques for Utilizing More Fully the Potential of Evaluation." Also see the excellent selection of articles (and bibliography) in Weiss, Evaluating Action Programs, op. cit. Also: Rossi and Williams, ed., Evaluating Social Programs, op. cit.; W. W. Charters, Jr. and John E. Jones, "On the Risk of Appraising Non-Events in Program Evaluation," Educational Researcher, Vol. 2, No. 11, November 1973; Evans, "Evaluating Education Programs - Are We Getting Anywhere?" op. cit.; Carol H. Weiss, "Where Politics and Evaluation Research Meet," Evaluation, Vol. 1, No. 3, 1973; Ernest R. House, ed., School Evaluation: The Politics and Process (Berkeley: McCutchan, 1973); Ilene N. Bernstein, "Validity Issues in Evaluative Research," Sociological Methods and Research, August 1975; and Francis G. Caro, "Issues in the Evaluation of Social Programs," Review of Educational Research, Vol. 41, No. 2, April 1971.

17. Abert data as adapted and cited in Biderman and Sharp, The Competitive Evaluation Research Industry, op. cit., p. 23.

18. Nelson and Mason, 1975 Federal Funding for Education Knowledge Production and Utilization: Project Content and Performer, By Agency, op. cit., Tables 15 and 16, pp. 33-34.

19. Bernstein and Freeman, Academic and Entrepreneurial Research, op. cit.

20. B. R. Worthen and R. M. Gagne, The Development of a Classification System for Functions and Skills Required of Research and Research-Related Personnel in Education (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, 1969); G. V. Glass and B. R. Worthen, Essential Knowledge and Skills for Educational Research and Evaluation (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, 1970); R. D. Anderson, J. M. Sopfick, W. T. Rogers, and B. R. Worthen, An Analysis and Interpretation of Tasks and Competencies Required of Personnel Conducting Exemplary Research and Research-Related Activities in Education (Boulder, Colorado: AERA Task Force on Research Training, Laboratory of Educational Research, 1971); B. R. Worthen, Some Tasks and Competencies Frequently Required in Educational Research and Evaluation (Portland, Oregon: Northwest Regional Educational Laboratory, 1974); B. R. Worthen, "Competencies for Educational Research and Evaluation," Educational Researcher, Vol. 4, No. 1, January 1975).

21. For instance, see: D. L. Stufflebeam, Proposal to Design New Patterns for Training Research, Development, Demonstration/Dissemination and

Evaluation Personnel in Education (Washington: DHEW, 1970); Paul Hood, Final Report of a Design of a Survey for Determining Training and Personnel Requirements for Educational Research, Development, Dissemination, and Evaluation, 2 volumes (Berkeley: Far West Laboratory for Educational Research and Development, 1972); and Richard A. Dershimer, W. James Popham, and William J. Russell, Development of Training Models for Educational Research: A Conceptual Scheme for a Professional Association (Washington: NIE, 1973).

22. AERA has been conducting training programs held during their annual meetings and also at other times of the year organized as traveling training institutes. AERA has also developed a library of audio-training tapes available for purchase. Phi Delta Kappa organized an Evaluation Training Network which provides training workshops.

23. For instance, see Campbell, "Reforms as Experiments," op. cit.

24. For instance, see: Egon G. Guba, "Developments, Diffusion, and Evaluation," in Knowledge Production and Utilization in Educational Administration, T. L. Eidell and J. M. Kitchel, eds. (Eugene, Oregon: Center for the Advanced Studies of Educational Administration, 1968); and Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.

25. See especially Scrimen, "The Methodology of Evaluation," op. cit.

26. Evans, "Evaluating Education Programs -- Are We Getting Anywhere?" op. cit.

27. See, for instance, Charters and Jones, "On the Risk of Appraising Non-Events in Program Evaluation," op. cit. This matter was treated extensively in our chapter on the implementation and utilization functions in educational R/D&I.

28. For instance, see Stufflebeam, "Evaluation as Enlightenment for Decision-Making," op. cit.; and Stufflebeam et al., Educational Evaluation and Decision-Making, op. cit.

29. Weiss, "Where Politics and Evaluation Research Meet," op. cit.

30. Ibid.; also see Weiss, "The Politicalization of Evaluation Research," op. cit.; and David K. Cohen, "Politics and Research: Evaluation of Social Action Programs in Education," Review of Educational Research, Vol. 40, 1970.

31. Weiss, "Where Politics and Evaluation Research Meet," op. cit., and Laurence E. Lynn, "A Federal Evaluation Office?" Evaluation, Vol. 1, No. 2, 1973.

32. Evans, "Evaluating Education Programs -- Are We Getting Anywhere?" op. cit.

33. Elmer B. Staats, "The Challenge of Evaluating Federal Social Problems," Evaluation, Vol. 1, No. 3, 1973.

34. Jerome T. Murphy, "Legislative Program Evaluation," Harvard Graduate School of Education Association Bulletin, Vol. 20, No. 1, Fall/Winter 1975/1976.

35. According to FY 1975 data, 89.5% of federal funding of educational evaluations is obligated through OE. See Ward S. Mason and Carnot E. Nelson, "Federal Funding of Educational R&D: R&D Function By Agency," Educational Researcher, Vol. 7, 1978, p. 15.

36. For instance, see: Office of Education, Work Statement for State ESEA Title I Reports: Review and Analysis of Past Reports, and Development of a Model Reporting System and Format (Washington: OE, 1974); G. K. Tallmadge and D. P. Horst, A Procedural Guide for Validating Achievement Gains in Educational Projects (Los Altos, California: RMC Research Corporation, 1974); D. P. Horst, G. K. Tallmadge, and C. T. Wood, A Practical Guide to Measuring Project Impact on Student Achievement (Washington: Government Printing Office, 1975); and Office of Education, Request for Proposals: ESEA Title I Evaluation Workshops (Washington: OE, 1975).

EDUCATIONAL RESEARCH, DEVELOPMENT, AND INNOVATION: THE INSTITUTIONALIZATION OF CHANGE IN EDUCATION

CHAPTER SIXTEEN

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CHAPTER SIXTEEN

ADMINISTRATIVE PROCESSES

XVII. ADMINISTRATIVE PROCESSES

As is typical of any newly developing R/D&I system, concerns for management and policy making processes have taken a low priority as compared to programmatic concerns. The dilemma is classical. Those who are most likely to initiate an innovative thrust are least likely to see the need for or pay attention to effective performance in the "mundane" problems of institutional management and the "dirty" problems of policy making. This has been the situation in educational R/D&I. Little attention was given in the past to such issues at the practitioner level, and management for educational R/D&I was not seen as a major and necessary aspect of the agenda of federal funding programs. With increasing maturation, again as is typical, concerns in these areas have begun to appear. Problems of organizational design, personnel management, project and portfolio selection, control and evaluation, cash flow management, information management, etc., have begun to plague managers and policy makers. NIE has begun on a modest scale to support some studies of management and policy making processes in R/D&I. The time would thus seem ripe for a major expansion in research and training programs devoted to upgrading the quality of management and policy making processes.

While little attention has been given the management of <u>educational</u> R/D&I, there is a large and growing body of literature on R/D&I management, and we can therefore identify, in broad outlines, the types of issues and concerns that need to be explored further if we are to realize significant advancement in the management of educational R/D&I.*

The management of R/D&I requires an understanding of dynamics which seem to be generic to R/D&I. These would at least include:

- R&D is by definition an area full of uncertainty and risk, especially as one moves closer toward the basic research end of the R&D spectrum.

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*Because we are here looking at general R/D&I issues, we will not attempt to provide references -- that would be a monumental task by itself.

- Both the nature and benefits of R&D outcomes may be unclear, and it is often difficult to determine cost, skill and time requirements.

- Different R/D&I functional activities (i.e., research, development, dissemination, etc.) have different time horizons and cost requirements. Personnel in these different functional areas tend to have different goal and strategy perspectives, may require different types of incentives, etc.

- There typically are tensions between the short term perspectives of users and funders of R&D (leading to demands for and evaluation of R&D in terms of "immediate results") and the longer time perspectives inherent in the nature of R&D.

- Support for R&D in general and for specific R&D programmatic areas tends to be cyclical.

- There tend to be swings in emphasis on centralization and decentralization in the management of R/D&I.

- The control requirements for R/D&I management present potential tensions with the requirements of creativity and innovation.

Program and project management are an integral part of the management of R/D&I. The types of issues that must be dealt with here include: program and project selection; the roles of and interface between program and project managers; issues of balance and synergy related to the selection and development of projects as part of program portfolios (rather than having a conglomeration of disaggregated and perhaps conflicting projects); relatedly, issues of balance, synergy and interaction across programs.

The management of R/D&I must be concerned with a variety of critical inter- and intraorganizational interfaces. Among these would be the interfaces between: programs and projects; the various R/D&I functional activities (between basic and applied research, between research and development, etc.); the producers and users of knowledge; departments within organizations; different organizations (including differences in the type of organizations involved, and as public/private, federal/state or local).

Closely related to the above is the issue of information flows within and between organizations: whether or not mechanisms and channels for information flow exist, and whether they are used or not (and by whom); choice among mechanisms and channels; incentives and disincentives or other barriers; etc.

Staging and phasing dynamics present special concerns for the management of R/D&I. For example, the type of and requirements on R/D&I management may vary significantly across different stages or phases of: a program/project cycle (e.g.: initiation, implementation, transfer of outputs); product life cycles; level of maturational development of an organization or system (including instances where differences in maturational levels exist across the different R/D&I functions or across different organizations). Here also arise management issues of timing and transition across stages or steps in a process, and/or from one department or organization to another; and of transition from one phase of maturational development to another.

Coordination is at the very center of critical R/D&I management tensions such as the management of interface relationships; the allocation of scarce resources in the light of uncertainty and risk; the need to be innovative vs. the need to solve "practical" problems; coordinating research, development, dissemination, etc. in light of their differences in time horizons and cost requirements; the very difference in perspectives, missions and needs of knowledge producers and knowledge users; how to deal with system "gaps"; tensions between "political" and "technical" perspectives; and so on. Questions arise as to the type of coordination mechanisms to use; whether coordination should be through formal organizational mechanisms, through leadership or consensus-developing types of processes, or through more emergent, developmental processes; the dynamics of the relationship between the parties involved; coordination issues arise within an organization, between an organization and other organizations, and across an entire R/D&I system or sector. In this latter case, the term "orchestration" may appropriately depict the linkage and coordination needs among a set of separately autonomous organizations, where such issues as turf, competition vs. collaboration, etc., come into play.

From a broad R/D&I system or sector perspective, a number of R/D&I management issues arise. Of particular importance are the roles and relationships of public vis-a-vis private agencies, funding agencies vis-a-vis funding recipients, and knowledge producers vis-a-vis knowledge producers. For example, what should be the agency/field relationship regarding funding emphases and program or project selection of a Federal funding agency? More broadly, to what extent and in what ways should and/or can any single institution provide a "lead agency" role in R/D&I system orchestration?

The above discussions illustrate the range of critical R/D&I management issues. While there is a large body of relevant literature, it is no exaggeration to say that compared to other R/D&I sectors, educational R/D&I management is a virtually unstudied and unformulated area. With the exception of some literature in the areas of change and innovation in schools and some recent general examinations of educational R&D, there is nothing to compare with the resources (books, journals, associations, etc.) in R/D&I management as can be found in other R&D sectors.

This does raise the question of possible transfer of R/D&I management technologies from other sectors to education. While this does hold important possibilities, it is equally important first to recognize the many ways that differences in sector-specific contextual factors can influence both the nature of R/D&I management requirements and the applicability of specific R/D&I management technologies. For example, there may be significant variations across sectors in such matters as: constituencies served; sources and forms of external pressures; concept of a "product"; innovation capabilities; differences in knowledge, personnel and institutional bases, nature, sources availability and availability of incentives and disincentives.

Thus, we may note that the R/D&I management field has, for the most part, grown out of sectoral contexts that vary in significant ways from the educational context. Industrial, military, nuclear and aerospace R&D, have been the largest contributors to this field, with contributions also being made in health and agriculture. These sectors tend to differ from education in the ways just noted. Further, the underlying scientific disciplines in these sectors are primarily the natural and biological sciences, while educational R/D&I builds, to an important degree, on a social science knowledge base and applies the products of R&D to sensitive social systems that are highly diffuse and complex.

While it is the purpose of this volume to describe more fully the various aspects of the educational R/D&I context, we may note here that it is a multi-disciplinary, political, value-laden, immature and vulnerable context -- factors which will significantly affect the management of educational R/D&I.

It may be hoped that a growing maturity in educational R/D&I will lead to a growing recognition of the need to study the management of educational R/D&I -- both to determine the specific R/D&I management dynamics and requirements in the education sector and to be able to utilize approximately and effectively the existing body of knowledge about R/D&I management gained from other sectors. As was noted at the beginning of this discussion, the time does seem ripe for such an undertaking.

EDUCATIONAL RESEARCH, DEVELOPMENT,

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OF CHANGE IN EDUCATION

CHAPTER SEVENTEEN

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CHAPTER SEVENTEEN

PRODUCTION

PRODUCTION

I. THE PRODUCTION FUNCTION IN GENERIC TERMS

In most R/D&I systems, the production function represents a critical linkage between knowledge production and knowledge utilization. The outputs of knowledge producing processes cannot be utilized by potential consumers unless they can be produced in adequate quantity and quality, in appropriate forms, and at acceptable prices. Generally, the production process requires translating a developed product or prototype into a set of product specifications and engineering requirements for the production process, establishing quality control procedures, determining what production skills are needed, planning production arrangements and controls, assenmbling the needed capitol and other resources, negotiating with suppliers and possibly also subcontractors, etc.

II. LOW PRIORITY OF PRODUCTION ISSUES IN EDUCATIONAL R/D&I

Examination of what is involved in the production of educational R/D&I outputs suggests why production issues are of relatively low priority and minimal concern in educational R/D&I. In education, essentially all design and development work is subsumed under the research and development functions. The production function is education, as we have conceptualized it, is restricted simply to the reproduction or manufacturing in quantity of fully developed and tested items. "Production" per se, then, is either non-existent in that the mass production stage is never reached, or it is little different from production in other fields.

A few examples should illustrate the point. Using our terminology, the taping and editing of Sesame Street segments, for instance, though referred to in the television industry as "production", is really part of the development function. A considerable amount of creativity may be involved in both the taping and the editing processes, and a number of decisions made during these processes may affect the finished product as much as the original scripts written for the segments. In this instance, "production", as we use the term, is restricted to reproducing the finished tapes for distribution, a process no different for education than for the entertainment or advertising industries.

To take another example, as we are using the term, the "production" of a multimedia instructional system (including print, film, audio tapes, and interactive computer console components) involves the reproduction or manufacturing in quantity of each item in the system (as previously designed and revised by the product's developers and evaluators), and perhaps the packaging of each set of items as a complete multimedia system. All the usual production issues come into play -- e.g., assuring adequate sources of materials, training and supervising production workers, assuring quality control of the finished products, controlling costs, etc. But none of these issues, and none of the production activities involved, would seem in any way specific to education.

Similarly, producing a textbook or set of printed materials for the education sector is no different from producing books and printed materials for other sectors. Much of the same could be said about producing films, or equipment, or how-to-do-it manuals for innovative change processes or instructional programs, and so on for all the various innovative outputs of educational R/D&I.

We do not mean to imply that producers who supply equipment to schools need not worry about the mechanical quality and durability of the tape recorders, audiovisual equipment, etc. that they provide. Continual equipment breakdowns are no more likely to be overlooked by school districts than by other clients in making future purchasing decisions. (There are already equipment testing organizations such as the educational Products Information Exchange that specialize in providing

providing consumer product information for the education sector.) Our point is simply that the overwhelming majority of educational products, programs, and other R/D&I outputs are software rather than hardware, the predominant medium is print, and the key issues of performance and reliability of such products have less to do with possible breakdowns in the production function (as we have defined this) than with weaknesses in the development function or the implementation process.

III. INSTITUTIONAL BASE AND FORMS OF PRODUCTION IN DIFFERENT SETTINGS

Production in the education sector tends to take one of two forms, depending generally on the type of institutional setting in which it takes place. It amounts to little more than reproduction of copies of materials -- mimeographing, photocopying, etc. -- in the case of most R&D organizations, and even more so in the case of practice-based development. Considerably more complex forms of production tend to be involved in the commercial production of outputs -- e.g., the production of textbooks, films, audio-visual materials and equipment, etc. The institutions that provide these production capabilities include publishers, film production companies, manufacturers of hardware and equipment, etc. and tend to be sector-spanning in nature (i.e., they produce outputs for not only the education sector but also several other fields, as well.)

There is generally a considerable difference in appearance between the products that come from the comercial firms and the outputs of the R&D institutions and practice-based settings. Commercial publishers generally strive for a high quality print product using costly materials and production techniques. On the other hand, the gloss of commercial publications is generally absent from the outputs of R/D&I organizations. To some significant degree, this appears to be a consequence of clearly articulated policy decisions of educational R&D sponsors and contractors. Educational R/D&I decision makers have opted consciously for allocating maximal resources to the research, design, development, and evaluation of the substance of the materials, and the barest minimum to production -- just enough to insure that a sufficient quantity of usable materials can be distributed to operating systems.[1] School personnel are as likely to anyone else to be attracted to beautifully printed materials with exquisite graphics and layouts. But their willingness to adopt and use excellent materials that happen to be produced by means of offset or xerox machines should not be particularly surprising: the teacher-made materials that make up the bulk of what is used from day to day in classrooms are likely to be reproduced by such inelegant technologies as mimeograph and ditto machines.

IV. ARRANGEMENTS TO STRENGTHEN LINKAGES TO PUBLISHERS AND OTHER PRODUCTION ORGANIZATIONS

There have been some notable instances of collaborative relationships between R/D&I organizations with strong development capabilities and commercial publishers who can provide high quality production facilities. Probably the most frequently cited of these is the arrangement between Appleton Century Crofts and the developers of Individually Prescribed Instruction.[2]

Two notable federal initiatives were undertaken to increase the possibilities for commercial marketing of R&D outputs. One, the Copyright Approval Program, allows copyrights to be granted on materials developed with federal funding. It supersedes the former "eminant domain" policy, and thereby provides a financial initiative for commercial publishers to use their resources to produce and market these materials. Between 1969 (when this policy was put into operation) and 1976 (when data on this was reported), more than 550 authorizations for copyrights had been granted under this program.[3]

The other effort, a Publishers' Alert Service, was created in 1972 to make publishers aware of various sets of materials developed under federal funding that were becoming available for publishers to produce and market. However, the publishing industry's response to more than 97 "Publishers' Alerts" distributed to them led NIE to suspend this service in 1976.[4]

Still, there appears to be a readiness on the part of at least some publishers to take a more active role in the production and marketing of R&D outputs, if adequate incentives can be made available and if the R&D outputs seem to be of sufficiently high quality to warrent their investment.[5]

Whatever may be possible for the future, at present these arrangements are relatively few in number; the existing linkages appear to be tentative and experimental; and as yet the production function is barely visible in the configuration of educational R/D&I.

V. FUTURE DATA GATHERING AND ANALYTICAL WORK WHEN THE STATE OF SYSTEM DEVELOPMENT WARRANTS ATTENTION TO PRODUCTION ISSUES

Before we will be in a position to strengthen the production function, we will need to know considerably more than we do know about the ancillary system of support services linked (or with the potential for linkage) in various ways to the educational R/D&I system. For instance, we will need to know more about: numbers and types of publishers, film and videotape laboratories, data processing organizations, etc.; their specialized capabilities; scale of operations; costs of services; etc.

It would be useful, too, to know what linkages now exist between these production facilities and existing R/D&I performers, distribution channels, etc. Information of this kind might possibly be gathered in some future cycle of the organizational survey conducted by NIE's Education KPU Monitoring Program, if this program continues. The list of production-relevent organizations generated by this research might then be used as the basis for sampling frames for subsequent in-depth research on the production capabilities able to support the functioning of the educational R/D&I system.

However, as we noted earlier, production issues are not of high priority in the management of the educational R/D&I system. Given the nature of educational R&D outputs and their "production", these matters may never become of great consequence for the management of the educational R/D&I system. At the very least, they are not likely to be given much attention. Until the system's KP functions and resources are sufficiently strengthened to make available a substantial number of R/D&I outputs for mass production, and until the financial resources for operating system acquisition processes are substantial enough to warrant the degree of gloss and quality that commercial production organizations can provide best.

Clearly, then, this data-gathering and analytical work on the production function can be shelved, at least until some future time when KP issues may be resolved sufficiently to allow policy makers to shift their attention to such other matters as strengthening production capabilities for large-scale production of high quality outputs.

FOOTNOTES

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2. For instance, see James W. Becker, "Incorporating the Products of Educational Development into Practice," Journal of Research and Development in Education, Vol. 3, No. 2, 1970, Reprinted in Hemphill and Rosenan, op. cit. and in The Oregon Studies, Vol. II, op. cit.

3. National Institute of Education, 1976 Databook: The Status of Education Research and Development in the United States (Washington: NIE, 1976), pp. 59-60.

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5. See discussion by or about publishers and the roles they might play in: Association of American Publishers, A Statement Prepared for the National Institute of Education by the Association of American Publishers (New York: The Association, 1971), ERIC ED 088 410; Sidney P. Marland, Jr., Educators, Publishers, and Federal Policy, Paper presented at the Annual Meeting of the American Association of Publishers, Bermuda, May 1972, ERIC ED 067 661; R.F. Baker, "Educational Publishing and Educational Research and Development: Self-Same, Symbiosis, or Separate," Educational Researcher, September 1975, pp. 10-13; and Henry M. Brickell et al., Conference Report: Dissemination of NIE-Sponsored Products (New York: Institute for Educational Development, 1973), ERIC ED 088 467.

EDUCATIONAL RESEARCH, DEVELOPMENT,

AND INNOVATION: THE INSTITUTIONALIZATION

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CHAPTER EIGHTEEN

SUPPORT SERVICES

SUPPORT SERVICES

Page

I. SUPPORT SYSTEM ISSUES GENERIC TO ALL R/D&I SYSTEMS

R/D&I systems are rarely totally self-contained. They generally require support services from other systems, organizations, and/or sectors. Different support services are generally required for different R/D&I functions and activities.

We have noted elsewhere a number of key issues that need to be explored to understand the relationship between an R/D&I system and the support systems on which it relies.[1] Some of these issues have to do with support service requirements (e.g., determining the system's requirements for different kinds of support services, the level of sophistication and/or specialization required in the various services, and how these requirements may differ by R/D&I functions, institutional types, product types, and level of maturity of R/D&I system functioning). Other issues relate to the characteristics of the services available (e.g., quantity, quality, level of technical capability, and costs). Still other issues relate to linkages to support services (e.g., what linkages exist, what gaps, and what barriers or constraints to linkage). A key set of questions revolves around the extent to which a system is either able to provide such services for itself or must "rent" or buy these services from outside the system, which services should or should not be provided by the system itself, and what the effects are likely to be of dependence on other systems for the provision of different services.

The educational R/D&I system has not yet begun to consider such matters. The primary institutional base of educational R/D&I performing organization is still so weak and immature that support services have not as yet been seen as a significant concern. And this is as it should be. However, with greater system maturity, support service requirements may warrant greater attention.

II. <u>SUPPORT SERVICES FOR EDUCATIONAL R/D&I: THE CHANGES BROUGHT BY LARGE-SCALE RESEARCH AND R&D</u>

As educational research and R&D activities have expanded in scale, the traditional research pattern of the indicidual scholar working relatively alone in his study or his laboratory has been replaced by team research under complex organizational and inter-organizational arrangements, supported by a complex subordinate system of mostly sector-spanning private corporations providing services and supplying and maintaing equipment.

Included in this support system are the traditional research support services -- e.g., research libraries and suppliers and maintainers of the equipment used in laboratories. Also included, however, are suppliers and maintainers of the kinds of equipment and services that distinguish the newer, larger-scale research and R&D from the older, smaller-scale research and R&D pattern -- e.g., computer centers, data processing service bureaus, and computer maintenance services; the suppliers and maintainers of calculators, photocopiers, typewriters and other office equipment and of the various kinds of audiovisual hardware that are becoming so prominent in instructional system development; the film laboratories, videotape editing facilities, cassette reproduction laboratories, and printing and publishing facilities that play such important support roles in the porduction of materials and complex multimedia instructional systems; survey research service organizations that play a dual role both as R/D&I performers on projects of their own and as suppliers of support services for other R/D&I organizations; and the various mechanisms and arrangements that exist to protect proprietary rights for R&D outputs that are not clearly in the public domain. Included too, especially for the larger and more complex projects, are secretarial and clerical services, generally but not always provided internally.

III. AN INADEQUATE KNOWLEDGE BASE ON THE SUPPORT SYSTEM

There is relatively little in the published literature about the subordinate system of support services for Educational R/D&I. We assume that there is a great deal of information in the files of federal agencies and R/D&I organizations that would be useful for assessing the scale, distribution, organizational capabilities, and client service patterns of the various support systems; the relative cost-effectiveness of the in-house vs. external strategies for supplying different support services (e.g., data processing or survey research units) for different purposes in different types of organizational settings; and the strengths and weaknesses of various kinds of procurement arrangements that are used. Some analytical work might provide a considerable amount of useful information from these existing data sources.

In addition, information about linkages to support services may be generated from future cycles of the organizational survey conducted as part of NIE's Education KPU Monitoring Program, if this program continues. Lists of support service providers might be generated from this work and used as a basis for sampling frames for subsequent in-depth research on the services used to support various kinds of R/D&I activities and types of organizations performing these activities, to determine from R/D&I performers what support services they use, the extent to which they rely on sources within or outside the educational R/D&I system for these services, and the implications of these different use patterns.

Transfer of support system management strategies from other sectors might be accomplished with relative ease once the configuration, dimensions, and service patterns of the support system for educational R/D&I are clarified and related to those contextual conditions that function as constraints on the procurement and provision of support services for the educational R/D&I system. However, work of this kind is clearly a long way off. It is not likely to warrant priority attention until the institutional base of R/D&I performers is sufficiently strong and mature to permit system policy makers to shift their attention to strengthening the various systems of support services required for educational R/D&I functioning. Still, system policymakers should be aware of the subordinate system of support services and keep it in mind as an area for policy development at some future point in the historical development of educational R/D&I.

FOOTNOTES

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EDUCATIONAL RESEARCH, DEVELOPMENT,

AND INNOVATION: THE INSTITUTIONALIZATION

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CHAPTER NINETEEN

SYSTEM STUDIES

SYSTEM STUDIES

Two of the most significant indicators of the maturity of an R/D&I system may be: the state of development of research on the R/D&I system itself, and the extent to which data on system functioning is used as a basis for policy formation.

There is a sizeable literature on the functioning of educational R/D&I. (We have been attempting to review, synthesize, and assess that literature throughout this volume.) But there is relatively little of what we would describe as either R&D system studies in a "research-on-research" mode (i.e., systematic studies of the research and development process for purposes of increasing knowledge about the R&D process and/or as an aid to decision making and policy formation"[1]). And there is little if any evidence that whateven data have been gathered on system functioning have significantly affected system policy formation or decision making.

In this chapter we will examine first what is availabe in the literature, and then turn to what more may be needed to further the maturation of the educational R/D&I system, inform system policy development, and improve system functioning.

I. THE EXISTING LITERATURE

1. Factors Accounting for Proliferation of Literature on Educational R/D&I Functioning

Given the relatively brief history of educational R/D&I, there is an astonishingly large accumulation of analyses and empirical research on the functioning of the system. This is attributable in part to the negative political climate in which the system functions -- the lack of confidence in Congress and various federal agencies in the educational R/D&I enterprise. As commented on in early literature,

*This chapter presents in summary form material that will be expanded extensively in the next draft of this volume, already in preparation.

there has been a tendency to pull the system out by its roots every couple of years to see how well it is growing and to determine how its effectiveness might be improved. A large number of these analyses were conducted by or for federal agencies or Congressional committees.[2]

A second factor of some importance in accounting for the large number of analyses was the increasing self-consciousness of the social sciences in the late '60s as to their proper role in relation to governmental agencies and the utilization of social science knowledge. Some of the relevant literature was provided by study committees of the National Academy of Sciences - Natonal Research Council; the Natonal Science Board; the National Academy of Education; the President's Science Advisory Committee.[3]

Some of the relevant literature is traceable to an international stimulus a request from the Organization for Economic Cooperation and Development (OECD) for OE to participate in a cross-national review of educational R&D and an analysis of how R&D might be strengthened to increase its potential for improving educational practice.

Some of the more recent literature is the result of the emergence of knowledge production/utilization as a new research area in the educational research community.[5]

But probably the most important impetus of all in recent years has come form the sponsors of educational R/D&I, not only OE and NIE but also private foundations such as Russell Sage -- e.g., their strong interest in evaluation research as a basis for policy formation,[6] and their initiatives to support the design, development, and utilization of routinely collected data bases for monitoring the progress of the educational KPU system, detecting problems, and determining the impact of policy initiatives.[7]

2. Types of Literature

The literature can be categorized into eight types of presentations:

1. distillations of expert analysis and opinion;

2. systematic empirical evaluations of particular components or outputs of the educational R/D&I system;

3. secondary analyses of existing data;

4. case studies of exemplary educational R/D&I projects;

5. syntheses of the relevant literature;

6. conceptual work on system definition, mapping the domain of educational R/D&T, developing and integrating conceptualizations of the nature of the system, and identification and/or exploration of conceptual issues;

7. policy studies on "system" issues; and

8. Outputs of the Education KPU monitoring Program (including descriptions of the data base and monitoring program and also data gathered under that program).

Much of the relevant literature (and virtually all of it that was produced during the first few years of the federally funded system's history) falls into the "distillation of expert analysis and opinion" category. These analyses were generally based on interviews; site visits; examination of materials in agency files; perusal of system outputs;of the insights of individual members of advisory panels, or the judgments or recommendations of tull advisory panels.[8]

Systematic empirical investigations make up the second largest category -- e.g., evaluations of personnel training programs;[9] or ERIC information products;[10] or pilot state dissemination projects;[11] or AERA meetings and journal publications as critical elements in the KP information flow system in education;[12] etc.

We include here especially several studies of the evaluation research function and how it is organized; who does what kinds of evaluations with what degree of effectiveness; how evaluation findings are used; etc.[13] The "research-on-research" character of these studies of the evaluation research function suggests a particularly high level of self-awareness within this function.

Existing secondary analyses have been done in two areas in particular -- demongraphic data on AERA members,[14] and funding data on federal sponsorship of educational R/D&I activities.[15] We would hope to see more secondary analyses when data from the Education KPU Monitoring Program's organizational survey[16] are made available for analyses by the R/D&I research community.

Some useful case studies have been produced about R/D&I functioning in various projects and project settings.[17] We would like to see many more such case studies, expecially if they are designed to provide process analyses of R/D&I functioning in a "research-on-research" mode.

There are relatively few documents in the other four categories. The literature that is available clearly reflects the institutionalization of "research-on-research" in educational R/D&I -- efforts to synthesize the existing literature;[18] efforts to map the domain of educational R/D&I;[19] policy studies on questions of funding and how NIE should relate to the "field";[20] descriptions of NIE's KPU monitoring project designed to: develop a data base on educational KPU functioning; use the data base to build models of the dynamics of KPU functioning in education; and monitor KPU functioning to identify problems requiring new policy initiatives or to assess the effects of existing policies and policy changes;[21] and data from the organizational survey undertaken as part of the monitoring program.[22]

In summary, at present, the research literature on educational R/D&I functioning touches on only limited areas of system functioning; provides relatively little empirical data; is atheoretical; and appears to be only minimally utilized by eithr sponsors or performers of R/D&I activity. However, all of this may change if the NIE monitoring project is effective in institutionalizing research on the educational R/D&I system and providing the kind of data base and policy analyses suggested in program descriptions.

II. NEEDED INITIATIVES

In its 1975 review and assessment of NIE funding policies, the advisory panel headed by Roald Campbell called for the establishment of "a very sophisticated research and analysis unit at the very top of NIE," with active involvement in the short-term and long-term planning and decision making carried out by the Institute's leadership. As envisioned by the panel, this unit would have sufficient resources to permit them to monitor and analyze system functioning and to provide the data base for "informed choice."[23]

NIE's R&D System Support Division has the potential to function in this manner, and took several important steps to begin development of the needed conceptual, analytical, and empirical work. Of particular importance was: their work on the publication of the 1976 Databook, updating OE's 1969 status report[24] (which was until 1976 the only comprehensive compilation and synthesis of information on the educational R&D system); their planning for an Education KPU Monitoring Program and their sponsorship of an organizational survey of R/D&I performer organizations as the first data-gathering effort under the monitoring program;[25] their awarding of several grants for preparation of conceptual papers[26] and several other, larger scale efforts designed to map the educational R/D&I domain[27] and develop the beginnings of an R&D system studies research community; their issuing of an "R&D Source Sought" solicitation for the establishment of an R&D System Studies Policy Center;[28] and their own important analyses of federal funding data, leading to publications providing the best available information on federal sponsorship of educational R/D&I activity.[29]

However, the R&D System Support Division has remained a small, underfinanced unit, functioning largely in isolation from (and seemingly with little influence on) top NIE planning and decision making. Plans for the R&D System Studies Policy Center were dropped, and even the future of the Education KPU Monitoring Program may be in jeopardy. Clearly, this unit has not been permitted to function in the manner suggested by the Campbell panel, and this critical system need remains unmet.

A well functioning, adequately financed unit of this kind could facilitate the emergence and development of an educational R/D&I system studies research community and provide top system policy makers with the kinds of sound empirical data needed to inform the policy process and enable NIE to actively perform its role as the lead agency for educational R&D. However, as yet, we see little evidence of any of this occurring in the near future.

FOOTNOTES

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2. Department of Health, Education, and Welfare, Review of Planning and Programs of the Bureau of Research (Washington: DHEW, 1968); Office of Education, Special Study of Educational Research (Prepared in response to request from Charles Schultz, Director of the Bureau of the Budget), August 1967; Office of Education, Office of Program Planning and Evaluation, Review of the Programs of the Bureau of Research (Washington: OE, 1968); Henry S. Reuss, The Use of Social Research in Federal Domestic Programs (Washington: Government Printing Office, 1967); and Special Subcommittee on Education, U.S. House of Representatives, Study of the United States Office of Education, 90th Congress, 1st session, House Document No. 193 (Washington: Government Printing Office, 1967).

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