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ABSTRACT

A basic introduction to the planning techniques required in the development of elementary teacher education models in presented. Educational models, systems analysis, and learning systems are explained in some detail, with emphasis on the development from symbolic analogy through mechanical, biological, cybernetic, and economic models. A good model is defined as complete, reflecting the real situation under review, understandable, and encouraging feedback which will influence and improve the system. Attention is drawn to some of the constraints on systems planning, including time limitations, lack of adequate data, too narrow a concept of the subject matter, failure in communication with universities, education industry, and organizations, and lack of understanding of related systems. Additional constraints which apply particularly to teacher education are certification requirements, personnel policies, the personality of the school administrator, parental attitudes, and the innate conservatism of the teaching profession. Six steps are listed describing the development of the model--conceptualizing the system, defining subsystems, stating objectives, developing alternative procedures, selecting the best alternatives, and implementing the system. A final warning is given that, while models should not be regarded as prescriptions to be automatically adopted, they provide a challenge and a tool for a necessary understanding of the whole system of teacher education. (MBM)

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Techniques for Developing an Elementary Teacher Education Model

A Short Review of Models, Systems Analysis, and Learning Systems

by

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PREFACE

The ten elementary teacher education models summarized in a companion report* were developed as part of a program sponsored by the U.S. Office of Education. (With the exception of the University of Wisconsin the Phase I project, the model design, was supported financially by USOE.) The purpose of these models is to provide total designs for programs to prepare elementary teachers for the schools of the present and the future. The charter required that the models incorporate the principles of systems analysis, behavioral learning systems, and other advanced planning techniques. Each model, to a greater or lesser degree, complied with the charter, and, as a result, education now has the first specifically planned, total programs of teacher education. In this respect, the models represent a significant advance in the field of educational planning.

This document is intended to accompany the summaries of the models and to supply a very basic introduction to these new planning techniques. The reader will find two kinds of information in this report. General principles and theoretical discussions of models, systems analysis, and learning systems are presented. This theory, however, has been simplified and kept brief. (Hopefully, it is presented in an understandable fashion.) Accompanying this basic information are examples drawn from the general field of teacher education and specifically from the models. The reader familiar with teacher education may find the use of these examples helpful in understanding the principles presented.

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* Analytic Summaries of Specifications for Model Teacher Education Programs. Falls Church, Virginia: System Development Corporation (TM-WD-(L)-319/000/00), July 1969. See the appendix for the source of all reports produced through Phase I of the Elementary Teacher Education Project.

It is emphasized throughout the document that each teacher education program and institution represents a unique situation and requires individual planning. The reader is urged to consider this short discussion and the summaries only as guidelines for his own efforts. No more than this was intended. Yet if discussion is provoked and insight achieved, some value can be assigned to this effort.

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New Planning Techniques and Systems

Teacher education in the United States has evolved in response to forces affecting the schools and the teacher's role. This education has been, in general, a reaction to societal forces, and only rarely has a deliberate process of planning been undertaken. The fault, however, does not necessarily rest with teacher educators. America as a nation has evidenced a distaste for deliberate planning, and until the second world war, little deliberate planning was undertaken in any social field--let alone education!

The increasing complexity of technology and expanding demands on the schools have made the deliberate planning of education a cultural necessity. To develop teachers and other educational personnel who will be responsive to the future needs of the schools requires the positive planning of preparation programs, both pre-service and in-service. This planning, in turn, introduces to education the use of many new teaching uses first developed in other fields. Broadly speaking, these techniques fall into three categories: educational models, systems analysis, and learning systems. These areas form an important background for working with the elementary teacher education models.

Educational Models

These ten elementary teacher education projects developed a group of program models but not model programs. The distinction is not merely one of playing with language. A model program suggests an ideal concept--one to serve as an example to others. Indeed, these projects may do just that, but it is not their primary intention, because a program model has as its purpose the organizing of parts, functions, and processes into a meaningful format for analysis and understanding. These elementary teacher education models, as their developers will be the first to admit, are hardly ideal. They are, however, important examples of how programs can be organized for effective presentation.

A model in this context is a representation of a whole, a total universe. Models resemble symbols because both are abstractions of reality. A symbol, however, represents a single idea, perhaps a very complex one, but a symbol does not represent a universe.

A model attempts to explain a complex organization or process by comparison or analogy with a commonly understood and less complex phenomena. The earliest models compared physical objects with abstract ideas. The pyramid of Egypt resembled the ascending levels of society and became a common way of explaining one form of social organization. These early models permitted the classification and organization of reality, but they did not permit the representation of a process.

During the fifteenth and the sixteenth centuries the use of mechanical models became commonplace. Based on a fascination for the newly developed clock mechanism, these models could show both organization and process. Each part could be clearly identified and the movement of all the parts together could easily be recognized. And if the model fell apart, much as the wheels might fall off a cart, one could still pick up the pieces and start the process operating again. This condition remains an important aspect of mechanistic models. This condition remains an important aspect of mechanistic models. The pieces are independent, much as a school district has traditionally operated independently of the teachers college although both contribute to the same process.

Mechanistic analogies were popular until the nineteenth century when the study of evolution provoked increased interest in biological models. Like the mechanical model this form of analogy showed the organization of the parts and the processes performed, but unlike the earlier representation, the parts of a biological model cannot exist apart from the whole organism. The heart, for instance, dies without oxygen from the lungs. Biological models

added the concept of <u>interdependence</u> to models while seeking to explain reality.

The biological analogy continues to exert a strong influence on models in the social sciences. Organizational science in particular has depended on this form of understanding. Such expressions as "the heart of the program," "the organization's lifelines" (meaning usually its resources and finances), "the guts of the organization," and "the lifetime of the corporation," all testify to the pervasiveness of biological analogies in the social sciences.

In education, such a concept as "the functional analysis of teaching" owes its origin to mechanical and biological models. While these analogies have proved useful for dealing with some problems, they have not always adequately explained the processes underlying teaching. Indeed, it has been suggested that some models of teaching vitiate effectively against improvements in the process of education by locking-in our thinking and hence preventing our ability to conceptualize the complexities of the system. New forms of analogy have been required, and these are being provided by the twentieth century revolution in our thinking about information and the consequent development of cybernetic models.

The evaluation of computer systems has meant that virtually limitless amounts of information can be processed rapidly and accurately. This development has motivated a revolution in thinking about effective models to describe the universe. One such model sees the process of evolution as the constantly increasing ability of the organism to communicate with its environment through continuous sophisticated systems for receiving and processing data received from the environment. A vital organ processes certain kinds of information and responds to changes in the environment.

Cybernation is a new field concerned with models based on information flow. Unlike the biological model which was limited to dealing with parts and wholes, cybernetic models permit a concentration on processes through an examination of the information flow in a given system. In brief: the system receives data, the data causes some action (or process) to occur, and this action results in some output. If the model is complete, information about the output, called feedback is returned to the system as a basis for changes and adjustments. This very basic cybernetic, or information flow, model can be used to effectively describe very complex realities including school systems, manpower programs, and teacher education programs.

The concept of an input-output model, however, first became popular in the field of economic planning. By comparing the input of resources--men, money, expertise, and technologies--to the resultant output of products, the effectiveness and efficiency of a system could be determined. By altering the combinations of resources the effects of alternative procedures for achieving the same ends could be measured and compared. Rather sophisticated mathematical processes have been developed to deal with these questions, although their applicability to education has been limited by disagreements about the purposes of an educational system.

As input-output models have been applied to educational problems, one conclusion always emerges: only very inadequate data exist about the nature of the inputs (time, money, expertise, etc.), about the effects of the educational processes upon students, or about the ability of these processes to produce the desired outputs. In other words, very little information has been developed as a basis for the construction of adequate models of the educational system or its subsystems.

Characteristics of a Good Model

So far, we have mentioned five kinds of models in their historical order. They are:

1. A symbolic analogy
2. A mechanical model
3. A biological model
4. A cybernetic model
5. An economic model

All these models attempt to describe a complex and usually non-physical reality by analogy with a simple and familiar set of concepts. All these models try to show the parts, the functions, and the relationships among parts of the reality they are describing. Each offers certain advantages depending on the purposes for which the model was intended. In any event, once models are constructed, they tend to become prescriptive as well as descriptive. People come to accept the model as the true description of how things are. In this case, it becomes necessary to reexamine the assumptions underlying the model and to redefine the significant factors in the description attempted by the model. This task, of course, underlies these elementary teacher education models.

What makes a good model? It has already been suggested that in this day and age there is a strong preference for models which describe the information processes within a universe of concern, but some other forms of modeling are useful depending on the purpose. All types of models, however, have certain characteristics by which their value can be judged. The following discussion enumerates a few of these:

The Model is Complete

Most models fail to be useful because they do not explain the whole system, or, if they describe only part of a system, they cannot be related to the rest of the system. Educational planning has been particularly guilty in this respect. School operating units are sometimes totally separated from the designers and producers of materials, and both remain apart from the colleges and universities producing the teachers. Small wonder then that many new teachers are unprepared to cope with the realities of the classroom.

To be complete, a model for teacher education would trace the process from the student's entry through his initial years of teaching. In other words, it would include both pre-service and in-service components in a common structure. The model would also describe the linkages between the college of education or teacher education program, as a system, and other parts of the total system of education. The flow of information and resources among these systems would be described, and the areas of independent and cooperative action would be indicated.

The Model Reflects an Operational Reality

When six blind men described the whole elephant in terms of their experience with a part, they were reacting in much the same way most persons describe the field of education. It is, of course, only human nature to reflect a personal bias based on experience and learning, but sometimes this range of perception prevents a necessary reconceptualization of problem areas--changes in behavior to meet changes in conditions.

John MacDonald points to some conceptions of teaching which prevent a confrontation with operational reality. He suggests first that by viewing the teacher as both an idealistic hero figure and a person trapped in a predetermined system of values a productive description of teaching is blocked. No hero can operate in a carefully circumscribed environment. The second

block to effectively viewing the teacher's role has been the concept of the "teacher as generalist," an omniscent renaissance man surviving in an age of overspecialization. The tenacity with which this view of teaching is upheld has prevented necessary attention to describing the tasks and activities of teaching, hence to limiting the kind of information so necessary for the construction of adequate models. A third inadequacy of our view of teaching according to MacDonald is our insistance that teaching can be learned by imitation. Student teaching remains essentially a form of apprenticeship in which the neophyte is introduced to the craft by the master teacher. This craft orientation prevents the development of teaching as an intellectually conscious task.

Perhaps no single model, or set of models, can achieve a completely adequate description of teaching. The important concern, however, should be that any model permits a realistic confrontation with reality, which, in turn, imposes the requirement that viewpoints be made explicit and attitudes be challenged.

The Model is Understandable

A model will be understandable if it describes a universe in a straightforward manner and if it can show a relation between its concerns and the next larger universe. A teacher education model, for instance, would be related to both a model of the total university and the educational system which consumes its products.

The amount of detail in a model frequently causes a problem. People tend to overdescribe those parts of a process with which they are most familiar and to overlook components which are beyond their field of concern. To guard against this tendency, a general model of the major parts should be constructed first. Each part can then be detailed, and in this manner the parts through any number of such iterations can be related to the whole.

The Model Encourages Analyses

The primary weakness in the research techniques of single variable analysis and controlled sampling has been their inability to encourage further analyses within the area of interest. Indeed, they limit inquiry and narrow the problem to a point which makes the results of such research of limited value for a field so complex as teaching. A recognition of this condition does not detract from the use of these techniques under appropriate conditions; rather, it requires that specific research be related to a pre-conceived general model.

Until recently, education has lacked these general models, and educators have been locked-in by buildings, content organization, and a confusion about aims and goals. To a large extent we have lost sight of the process of education because we have replaced it with a concern for the institution. Education models have become descriptions of structures rather than operations. These kinds of models fail to encourage the kind of analyses which facilitate basic understanding. Indeed, they tend to become circular: they seek for self-improvement based on traditional assumptions instead of questioning basic purposes.

The Model Encourages Feedback

As change and development become increasingly important, effective models must be responsive to the information from their operation and from their environment. This process is called feedback. The term is useful because it is more general than evaluation or assessment. Feedback implies that information collected is used in some way to affect the operation of the system. In other words, information from the operation is returned to the system to adjust it in order to better achieve its goals.

Feedback systems impose several requirements on the design and execution of a model. As has already been suggested, the importance of data (information) is basic to the concept of feedback. An effective feedback system is designed and implemented at the beginning of a process. Information about the inputs and the environment are collected, and statements of goals and purposes are formulated. At critical points throughout the operation of the system, and at designated concluding points, output information is collected for comparison with the original data. In this way, the effectiveness and the efficiency of the system can be measured. Appropriate adjustments can be made in the system's operation based on this information or in conformance with changing goals or standards.

Traditional teacher education programs have been especially weak in this kind of feedback system. Lacking a clear-cut purpose, the program generally produced a young teacher who is liberally educated and who has been exposed to some aspects of teaching--usually from a distance. The relation of these training experiences to the real world of teaching remains unclear, but adjustments are difficult because no feedback system--in this case, data from the teacher (and the school district) to the institution preparing the teachers, in a form encouraging program adjustment--exists to control the system. One important contribution of the elementary teacher education models is their direct involvement of local districts as feedback mechanisms.

An Introduction to Systems Analysis

"Systems Analysis" has become a popular catchword indicating a process for the application of scientific thinking to large problems. The phrase is used indiscriminately to mean the analysis of information for computer programming, the development of planned management activities, or, on other occasions, simply the orderly relationship between any two or more things or ideas. These uses, at least in the popular sense, seem to convey some special magic of science.

There has never been one system methodology; indeed, the tradition of systematic analysis in one sense is as old as Aristotle. What is new, though, is the concentration on quantifiable aspects of analysis (to the extent that this is possible), and on the isolation and control of the numerous factors and variables made possible through the power of the computer. This, in turn, has led to a revolution in our thinking about the nature, organization, and use of information, so that at the heart of systems procedures there exists a philosophy of information.

A Brief Description of Systems Theory

The word system is used to communicate many different ideas, but in this paper it should be thought of as indicating a process. In briefest form, "systems analysis" is an orderly process for, first, defining and describing a universe of interest (and the significant factors and their interrelationships within the universe); and, second, determining what changes in the universe will cause a desired effect. Systems analysis generally begins with the broadest statement of the universe and then isolates and defines parts of the system according to their functions, and then notes the interrelationships among these functions.

There are different approaches to the description of systems. The following, among many, will be appropriate for the present review:

1. Subsystem Description. A subsystem is an operational entity within a system capable of functioning independently or of permitting independent design and analysis. Critical factors in the selection of subsystems include, first, the explication of a major process within the system, and, second, a clearly understood relationship between the operation of the subsystem and the goals of the system.

Each subsystem description would contain information on the men, materials, etc., required for its operation, because the subsystem is an operating entity contributing to the goals of the system. Most significantly each subsystem would be described in terms of its goals and the process for achieving these goals. The resources required by each subsystem could be determined in relation to its goals.

In the field of education it is possible to suggest a number of viewpoints for the selection of subsystems. If the school is considered as the universe (the total system), the following subsystems might be considered:

1. Hardware subsystems including production, transmission, reception and related equipments, software, and service.
2. Specific curriculum areas (i.e., subject matter, but longitudinally, throughout the school experience).
3. Grade-level programs (the total program for the kindergarten).
4. "Package procurements" (perhaps a major unit of study organized around a major theme).
5. One or more specific and persistent educational problems (good health, physical handicap, reading difficulties, etc.).

6. Specific and persistent problems unique to the environment (poverty, isolation, teacher shortage, etc.).

7. Assumed needs (based on present inadequacies, conjecture that the present will not prepare for the future, "band-wagon applications," "equal education" themes, etc.).

Compatibility of system description is maintained when subsystems are selected according to a common viewpoint. The selection of a particular viewpoint represents an important decision for the systems analyst and is governed by a number of significant considerations aimed at permitting ease of analysis and design. Among these are the availability and form of required information, the avoidance of "sensitive spots," administrative decree (a weak viewpoint, at best), and the ability to operationally define the span of control. An effective viewpoint will avoid areas which cannot be changed or in which resistance to analysis is predictable. State-of-the-art information and prior experience with the system provide useful guidelines. The critical factor in the selection of subsystems is the clear-cut and simple explanation of the important factors in the situation.

Each of the elementary teacher education models organized a unique set of subsystems for developing a program of teacher education, but several major elements are common to all of them. Clearly the process of curriculum planning and development received considerable emphasis. In most instances management subsystems were developed. These included both the management of the process and the management of the student (i.e., entry profiles, achievement information, and proficiency standards). Separate subsystems for the production of materials, the procurement of professional staff, and the provision of buildings and equipment were not usually developed. This is justified because these areas, while important to the larger universe of the school of education (or other unit), are not major emphases in the development of an elementary teacher education program. This program uses

the end-product of these other subsystems, and, by specifying its requirements, it can then request these other subsystems to produce the desired products. This distinction in locus of control is extremely important. No one model can encompass the whole universe, and choosing a viewpoint which provokes concentration on the major program functions requires considerable care.

2. An Input-Output Model. Input-output models for educational planning have received considerable attention since the advent of PPBS (Planning-Programming-Budget Systems). These models begin by describing the desired outcomes of the system and then determine the changes necessary to achieve these outputs. For instance, in planning a program of teacher education, one would first describe the profile of the finished product, i.e., the trained teacher, and then determine what changes would be required in program entrants to achieve this end-product. Inputs to the system would also include the necessary staff and other resources required to operate the program.

There is, of course, an inherent dilemma in this kind of planning. No adequate, or relatively homogeneous description of the product (the teacher) can be postulated, and, therefore, any satisfactory program model would have to begin at this point. An input-output model in teacher education would be useful only to the degree that a relationship between this "picture" of the teacher and the program of preparation could be shown and that feedback procedures could be implemented to govern the process. This, in turn, implies that knowledge of the objectives is the first requirement of system design and evaluation.

3. The "Heuristic" Approach. This third aspect of system theory is more complicated than the preceding two, but it is most useful when the specific nature of the product cannot be clearly stated. Boguslaw suggests

that this approach "is not bound by preconceptions about the situations the system will encounter. Its principles provide action guides even in the face of completely unanticipated situations and in situations for which no formal model or analytic solution is available."

The critical aspect of this concept is the use of principles to guide action; again, the process is central to the analysis, governed by a statement of direction or goals. In other words, the set of principles should permit the establishment of a program to achieve specified ends <u>regardless</u> of the conditions under which the program might operate. In planning teacher education programs, principles concerning the nature of the teacher's role, the conditions of operating, the functions of teaching, and the personal characteristics of the teacher would be explicated as a basis for program design.

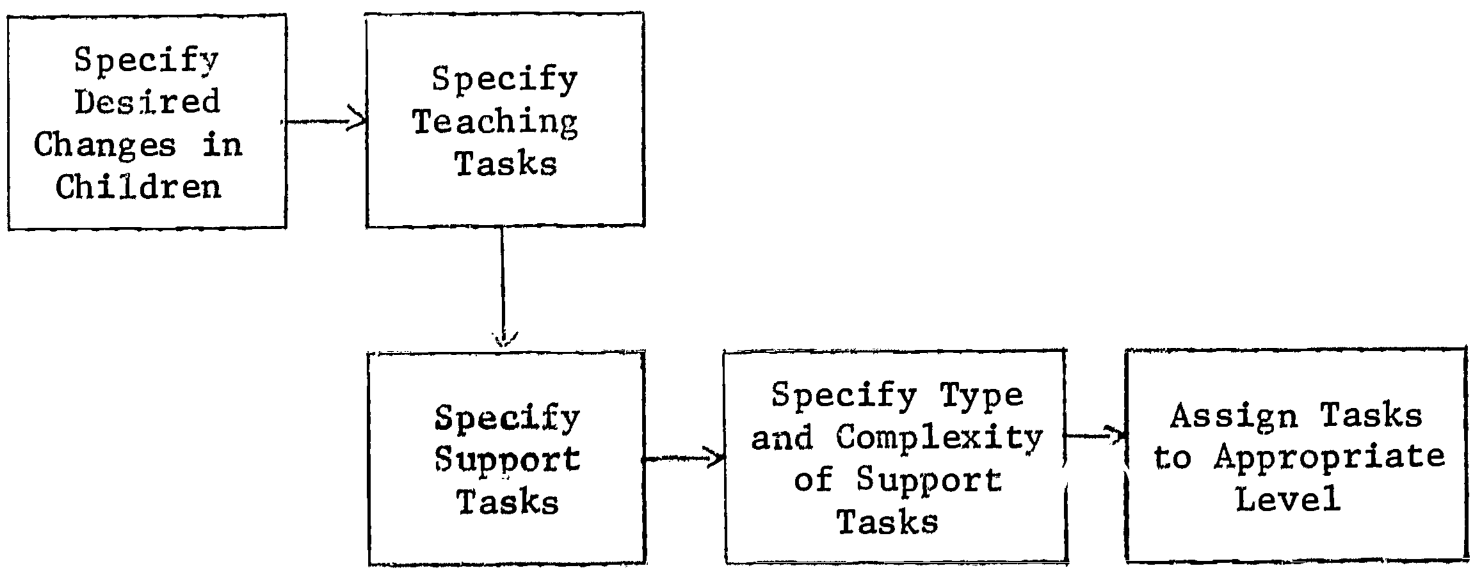
Our present knowledge of the teaching process suggests the following heuristic approach to the development of teacher education programs. This approach is an abstract--it depends on a number of theories extant within the field, and it doesn't do justice to any of them. It does, however, provide a basic example of heuristic planning.

Basically this approach provides for the step-by-step analysis of teaching in the following manner:

A. The behavior of all <u>teaching</u> personnel, i.e., individuals relating to children in the learning environment, should be related to its contribution to effecting desired changes in children.

Specify Desired Changes in Children → Specify Teaching Tasks → Specify Complexity of Teaching Task → Assign Tasks to Appropriate Level

B. Other tasks of educational personnel, i.e., those who while still performing as teaching personnel, are also concerned with tasks not directly related to interacting with children, can be described as: (1) they relate to the teaching function.



C. The primary concentration of analysis should be an effective interaction of a teacher-person with a learner. Other tasks could be organized as: (1) concomitant activities coterminous with the teaching task; (2) independent activities in support of the teaching task. The following organization is suggested by this distinction:

Tasks Concomitant with Teaching		Tasks Relating to But Independent of Teaching	
Tasks Related to:	Tasks Related to:	Tasks Related to:	Tasks Related to:
Learning	Team Membership	Support of Learning	Support of Team Tasks
Content Organization	Role Maintenance	Materials Design and Production	
	Group Maintenance		
Content Presentation	Change	Content Preparation	
		Content Organization	

Needless to say, this approach is highly theoretical, but it is useful for understanding the relationship of various kinds of inputs to the processes of teaching. At the present state-of-the-art, much of the specific information for designing programs based on this kind of analysis is unavailable. Research has not been concerned with this kind of paradigm. The challenge, however, should be obvious. If programs of teacher education (including the provision of other educational personnel) can be related to the effects these teachers will have on children, exciting and productive program planning will result.

Constraints on Systems Planning

The design of any system is constrained by many factors, some of them negotiable, but many of them beyond the control of the systems designer. Deciding which factors fit which category becomes an important aspect of the process. In a sense, systems designers are fortunate; they can design ideal systems, without consideration of the day-to-day real world operations which can clog the best of designs. The difficulty with this stance is that it has frequently caused the creation of beautifully engineered systems which are perfectly incompatible with their environment. On the other hand, unless designers consider carefully just how realistic some assumed barriers are, their field of vision will be limited, and the system will fail to cope with the true problems. In the planning of programs of teacher education, the following constraints are significant:

1. Time: The first constraint is time. We are required to educate a teacher in four years or less, or perhaps five, if the masters program is included. It is easy to conjecture programs which take less time, either because of a reevaluation of educational requirements or through increased efficiencies in the training processes. The models have contributed greatly to this discussion. They have also considered the apportioning of time among required areas of study, experience, and on-the-job practice. In a similar

manner the close relationship between pre-service and in-service training has contributed to an understanding of the time factor in teacher training.

2. Data: Perhaps the most important constraint on the design of elementary teacher education programs is data. We simply don't possess adequate information in a number of areas, especially the relationship between a teacher's behavior and a student's learning, to adequately design programs. Using present information in the designing of the models has pinpointed many of these gaps and suggested new and significant areas of research in teacher education.

3. The Scope of the System: The broader the initial conception of the system, the stronger will be the design of any sub-universe. For example, a major weakness of teaching has been the inability (through time and press of responsibilities) for the classroom teacher to get beyond the four walls of the room and to interact with other colleagues. This condition contributes to a narrowing of vision and an inability to view the process of education as continuous. The relationship between first grade and sixth grade is often blurred; subjects are repeated, and students are confined to a limited curriculum. At a larger level of analogy than the classroom in the school, education in general operates on three distinct subsystems: the operating district, the university which produces teachers, and the "industry" which produces materials. Little direct communication and even less joint planning has existed among these groups. Indeed, interaction has often been considered undesirable. The models have carefully examined some of these relationships and are moving to increase both the scope of the system--the broad view--and the potential interactions among the constituent parts.

4. Communications: Any system is constrained by the ability of the parts to communicate with each other and by its ability to communicate with other systems. For instance, the relationships between teacher education programs and the other parts of the university are sometimes counterproductive. On

the other hand, some school systems have developed operational linkages with many universities, industries, educational organizations, and other groups. Through this process of extending communications channels, the concept of the system and the program of education are extended beyond the limits of the school.

5. Integration: It is often possible to design a beautiful system, one which is consonant with our view of reality, but then have it fail because it does not resemble the real world of other system designers. If the system of educating elementary teachers results in a product which is unable to function in harmony with teachers trained through other systems, communication will be limited and friction will result. The process of obviating this difficulty is called integration. It requires that the designers of a system, regardless of how complete that system may be, must be aware of that system's ability to mesh with other systems. An educational program which does not produce the kind of labor force required in the future will not serve the needs of the economic system; similarly, a school system which cannot educate a large percentage of its students cannot claim absolute control over the process of education. The models have been aware of these difficulties, especially in relating the program of teacher preparation to the realities of the changing school and culture. Since this process is evolutionary, it is more difficult than in some other kinds of design. Its importance, however, cannot be urged strongly enough.

6. Facilities: So frequently is heard "Design the program, then build the building." What usually happens is that the program is constrained by the pre-existing building. Facilities too frequently control the potential decisions. New techniques such as modular walls, inside-outside rooms, and heat, light, and sound controls (for example, the multi-media rooms with student response systems) offer fewer constraints on program planning than do the older buildings, but they are still constraints. Sometimes a

pre-existing building makes little real difference, but on occasion, it can determine the success of the program. On the other hand, the location of activities can play an important part in the nature and quality of an experience. Watching pupils in a classroom--actually taking part in the activities--can result in perceptions quite different from observing a movie in a college lecture hall. Since it is particularly difficult to change extant facilities, careful planning must precede their development, but careful planning can also obviate many of the apparent restrictions on present facilities.

7. Resources: To a systems analyst, resources are of many types. The most obvious one, of course, is money. Others might include: teacher time, student time, equipment, space, expertise, information, and other institutions. The list of potential resources can be quite long. Frequently, systems operate without considering the broad number of resources available to it. Recognizing these resources forms bases for designing alternative systems so as to conserve the use of the critical resources. Generally, in education, we have assumed that the student's time was the least valuable resource, but if we plan programs to make effective use of this time, it becomes a critical resource itself.

Constraints on Teacher Education Programs

The above list of constraints can apply to the design of any program, and each planner must apply these principles to his work. In the field of teacher education, several specific constraints can be mentioned. Some of these define the limits of potential programs, because they can be modified only within fixed limits. Indeed, changing them requires changing our perceptions of teachers in rather radical ways. This may be a necessary concomitant to the improvement of teacher education, but it is a slow process. Nevertheless, in some form or other, the following constraints will affect the program planning:

1. Certification Requirements: Each state establishes minimum requirements for the certification of professional personnel. In the field of teaching much progress has been made towards establishing uniform certification and towards focusing the proficiency measures on the teacher education institution. The state still sets the standards, but the college certifies that graduates of its programs have met these standards. Any program of teacher education, including the models, must be consonant with present standards. In one sense, this implies a hardship because the granting of a degree is universally accepted as evidence of qualification to teach. It may be conjectured that other avenues of entrance, among them the new careers profiles, offer viable alternatives to the four year undergraduate program.

2. Local and State Personnel Policies: Personnel policies are established to govern the behavior of individuals within complex organizations. Usually, these large institutions require some form of structure to promote their purposes. On the other hand, personnel policies sometimes vitiate against the kinds of individuals who can make a positive contribution. For instance, how many persons choose not to teach because of policies against beards, certain codes of behavior, or various ethnic costumes? Again, the schools have become increasingly liberal, or at least sensitive to individual differences, but these policies still exert a strong pressure on the acculturation aspects of teacher education programs. "Adjusting to the realities of teaching" rather than "developing the person as a teacher" too frequently governs the design of programs. The models, it must be pointed out, have done much to examine these problems and to resolve this inherent conflict through providing a number of experiences and career lines.

3. Individual School Administrators: The building administrator is usually free to rule within his four walls and football field much as he sees fit. His style of leadership will determine both the tone of the school and

the quality of the education. He usually selects teachers with whom he can get along. While this management technique appears reasonable, it can serve to prevent diversity and to limit the kinds of experiences available to students. In terms of models, it can mean that some schools will not find the new breed of teacher acceptable. For this kind of reason, no doubt, we find several of the models advancing the concept of "portal school," a specific school within a district which will serve as a bridge between the college and the world of teaching.

4. Parents Anticipations: To a considerable extent, teacher behavior is limited by the anticipations of parents. Frequently, effective teaching methods and styles must not be used because the community does not find them acceptable. In particular the disparity between teacher behavior, as considered desirable by parents, and the kinds of behavior which meet the child on his own level, can cause conflict for the teacher. Unless a program of public relations is carefully developed, new forms of organizing for teaching--teacher aides, clerical assistance, team teaching--will meet with criticism, usually good intentioned out of concern for the child. Preparation programs are pressured by these constraints, especially when they tend to adapt unilateral models of teaching to appease pressure groups.

5. The Profession: The teaching profession, at best highly conservative and inbred, fears radical departures from present practices. On the other hand, a new breed of teacher, militant, liberal, and action oriented, finds itself defeated by outdated administrators and unresponsive school systems. Or again, teacher activism concerns itself with pay and prestige rather than with problems of change and education. Still a fourth point, little progress could have been made in American education without an organized profession of teachers. Regardless of the stance, and there are many to choose from, the profession, through its several agencies and organizations,

advises, directs, and censures many practices in teacher education. In one respect, a profession is, by definition, an inhibitor to change. Those who are "in" will keep others out, until the "outs" come to look like the "ins." This professionalism is as much an unconscious phenomena as a direct threat to programs of preparation. The models, having sensed these problems, have worked with the organized professional organizations and with teachers associations in local districts. Nevertheless, the stance accepted by the professional groups interacting with a program of teacher preparation will in large part affect the ability of that program to achieve its goals.

6. The Teacher Candidates: Teacher education programs must be responsive to the persons who apply for admittance. During the past two decades numerous authors have pointed out that the lowest calibre of university student enters the field of education, and, consequently, quality programs must be "watered down." Other writers have suggested with equal force that good programs will attract strong candidates. There is virtue in both positions. Yet other studies indicate that even graduates of strong programs leave teaching after three or five years unless they have "acculturated" to the existing limitations of the school. At best the very conditions of teaching seem to limit the effectiveness of strong college programs. The ten models have set reasonable admittance standards, and they have envisioned attractive programs. It seems reasonable to expect that they will attract desirable candidates. Working with local districts should do much to improve the retention of graduates. These are encouraging signs.

The Importance of Information

Systems analysis is based on information. Systems theory evolved as an information-oriented decision-making process. In this respect systems designs are based on the requirements for getting and organizing information. Four kinds of information are usually specified: input, output,

process, and environment. To express this concept in basic terms, we want to know what the student looks like when he enters the program and how he is different when he leaves. What knowledge and skills does he possess as a result of the program? Again, we want to know if the program was effective and/or efficient? Did it achieve its aims and goals, that is, did it change the student in the way we desired him changed? All of these questions in the last analysis are "situation specific," that is, they operate within a definable environment. Our fourth form of information then requires that we understand the relation of the process to the environment. Was the process an acceptable system within the operating environment? Did it change the environment? Did the environment change the system? What adjustments were required because of constraints imposed upon the program?

The feedback system developed as a part of the system design provides these kinds of information at appropriate operational points. Changes in the system can be made as a result of the information received through operating the system, or as a result of changes in the environment. Similarly, the environment provides information on needs, and this information affects the priorities assigned to various processes. If it is more important to produce teachers strong in arithmetic and science skills, the program can be adjusted accordingly. The particular information requirements of an elementary teacher education model will vary according to the conception of the system, its definition of the teacher, and its relationship to the environment, and it is difficult to do more than suggest the importance of designing a system based on information, not on professional judgment, clairvoyance, or luck. In this respect systems analysis provides a realistic framework for applying the results of research and other feedback activities to the improvement of the process.

Some Fundamental Kinds of Information

The systems analyst, as he looks at the process of teacher education, would be concerned with selecting an approach and explicating the constraints. To aid him in this process, he might ask himself the following questions:

1. What are the functions and tasks of teachers in the context of the school environment?
2. What do we want the teacher to do in the learning environment?
3. What knowledge and skills are required in order to perform these functions and tasks?
4. What experiences would reinforce that knowledge and give the prospective teacher the chance to practice the tasks?
5. How can this analysis of functions and concomitant knowledge and experiences be stated in terms of program goals?
6. How could a program of teacher preparation be organized to achieve these goals?

These questions then suggest a number of program construction guidelines--heuristics--which can be applied with greater or less reasonableness to the design procedure. Each model, of course, has undergone a similar development sequence, and each focused in a unique fashion on the area of elementary teacher preparation. The following guidelines, therefore, are merely generalizations. Each person designing a model would need to restate the question in terms of his operating environment and program goals:

- All program experiences should come from statements of goals and should be related to these goals.
- All program experiences should provide a thoroughness and understanding of the basic concepts of the subject under consideration, including the ability to discover and to apply this knowledge.

- All program experiences should be designed for effective presentation, including the maximum of student activity, utilizing the modes known or rationally assumed to be most effective for presentation.
- All program experiences should be designed for maximum efficiency in presentation, based upon preservation of the critical resource, which, in this case, is assumed to be student time.
- All program experiences should utilize measures of cost effectiveness in development and presentation, insofar as cost effectiveness does not require sacrifice of the critical resource, student time.
- All programs should be organized sequentially, insofar as this is possible, to include attention to individual cognitive styles, prior background and experience, and special learning difficulties.
- All programs should be designed to provide a constant system of feedback, first to the student on his progress and standing, second to the teacher on the success of the particular program, and third to the institution on the relation of the particular program to the total program of teacher preparation.

A Step-by-Step Procedure

There are six steps in the process of systems analysis. Each step requires its own group of techniques and suggests a different set of problems and limitations. Systems analysis has perhaps been viewed with greatest alarm through pre-occupation with these limitations.

STEP ONE: CONCEPTUALIZING THE SYSTEM OR THE "PROBLEM UNIVERSE"

The first step develops a clear statement of the system of concern. This definition includes all those elements which are a part of the problem universe. The analysis also sets limits to the problem by separating the system from its environment and by relating it to other distinct systems.

Every system is a subsystem of some larger system and is composed of a hierarchy of subsystems, sub-subsystems, etc., each of which is a system in its own right. The systems analyst, therefore, must select a universe which is consistent with the purposes of his analysis. A useful and productive analysis is distinguished by the formulation or design of the problem, the selection of appropriate objectives, the definition of the relevant and important environment or situation in which to test alternatives, and the provision of reliable cost data and other pertinent information.

Having selected an appropriate system, and hence having some notion of the sub-systems, the analyst then isolates the parts of the system:

Determinants: elements outside the system that determine the nature, form, and limits of the system.

Components: the "moving parts" of the system which include the mechanisms, men, and facilities within the system.

System Integrators: the elements that integrate the moving parts.

STEP TWO: DEFINING THE "SUBSYSTEMS"

A subsystem is an operational entity within a system, capable of functioning independently or of permitting independent design and analysis. Subsystems are defined according to sets of common properties. In the design of weapons systems, the major subsystems are hardware, training (or personnel), and administration. Subsystems interact at the system level through a process called "systems integration."

STEP THREE: STATING THE OBJECTIVES OF THE SYSTEM

Systems procedures have sometimes been defined in terms of two basic operations; first, state the goals for the resolution of a problem; and second, organize the means to achieve these goals. In any event, the critical point

in understanding or using system procedures rests on the importance of clearly explicating the objectives of the system. Indeed, every element within a system is evaluated in terms of one basic question: Does it contribute effectively to the achievement of system goals? A mechanism, therefore, for determining the objectives of the system, for ranking multiple objectives, and for choosing between incompatible objectives is a first requisite for effective systems planning.

System Objectives in Teacher Education

The preceding discussion has provided a process for determining the objectives of a teacher education program and has indicated some of the difficulties in achieving adequate statements of aims and goals. Two guidelines, however, remain to be mentioned:

1. State alternative series of objectives based on the profiles of individual students.

Since the programs will service quite disparate varieties of students, objectives should be stated which are compatible with these profiles. Each student's program will, in some manner, be unique, but all will contribute to achieving the general goals and objectives of teacher education. In a sense, each student could be thought of as a subsystem, representing a unique input and output, and presenting a unique confrontation of process and environment. In this respect it is possible to establish the basis for individualized programs of instruction. The present models have been especially responsive to this aim. Much of the information nandling problem has been solved through the design and implementation of computer information and guidance systems. Most modules provide for individual pretest and post-test and remediation based on individual needs. The statements of objectives for each individual should be directly related to the broad objectives for the program, however, and this can be achieved through developing a careful control and evaluation process.

2. The process of explicating objectives should remain flexible and responsive to changing patterns of teaching and learning.

This consideration is really a reminder that the systems procedures are a constantly reiterative process. One does not state objectives and then pass on to the next steps in the process. Both changes in the environment and measurements from the operation of the process will affect the statement and ordering of objectives. It appears highly desirable that a continuing review process be established for determining the value of the objectives and the ability of the processes to meet them. Otherwise, even a carefully designed program will atrophy.

Stating Objectives for the System

The second form of goal setting focuses on the operation of the system. These goals concentrate first on how the system is intended to affect groups of students and then on the effective management of the system. Programming, Planning, and Budgeting Systems (PPBS) and other cost-effectiveness techniques are designed to help assess the operation of systems in relation to previously stated goals. The establishment of system-level goals is important because it permits the efficient and effective selection of alternatives. For educational planning, however, a concentration on the system level may omit an adequate view of the final product, the student.

The system procedures techniques, developed for the design and delivery of hardware systems and their required support systems, tend to concentrate on aspects other than the individual. They are appropriate to the design of such technological systems as educational television, mobile facilities, or a computer system, but once these systems are designed, they must be seen as means for the achievement of goals relating to the individual. This consideration suggests that a dynamic interaction between these two design levels should be maintained to insure a fit of the system with the essential purposes.

The question of an appropriate statement of objectives within the framework of systems procedures has received considerable attention, especially since these techniques have begun to move into the social sphere. There is no doubt that to the degree objectives can be made explicit and goals objectified, the deliberate design and analysis of systems is enhanced. Some writers have gone so far as to suggest that systems analysis represents a viable approach only in situations where the goals permit quantifiable measurement, but this position remains extreme.

If the whole of teacher education cannot be explicated and quantified, because the whole of teaching (as an art) somehow defies analysis, the systematic planning of many experiences can still be undertaken. The physical properties of color have been explicated and can be known by every budding artist. This knowledge, however, will not guarantee a Picasso, but it is highly unlikely that Picasso could paint without such basic information. In exactly the same sense, the teacher will operate as an individual person with his pupils, but he can be trained in many of the skills and techniques which will facilitate that performance.

STEP FOUR: DEVELOPING ALTERNATIVE PROCEDURES

Once the goals for the system have been established, the system designers will explore the various alternatives available to them for the accomplishment of the goals. Alternatives may be designed to utilize various uses of resources (especially cost levels) to indicate different career paths based on variations in entry profiles, and to develop operating relationships which are necessary for implementing new technologies. Since so much research has remained inconclusive, it can offer little firm decision value. Nevertheless, research and practice are excellent sources for determining worthwhile alternatives.

As alternative procedures are designed, it is important to predict the consequences of selecting one alternative over another insofar as this is possible. For instance, what are the implications for the total system on a program based on considering the student's time as the critical resource? Or, what will be the differences in appreciation for a subject if it is learned through a series of programmed instructional units rather than in a group situation? Each program designer should conjecture both the positive and negative consequences of decisions about alternatives.

The story is told of a teacher who, having great difficulty with a pupil, consulted her supervisor. She explained the problem, the pupil's reactions, and her behavior. After listening to her story, the supervisor asked her what alternative strategies she was using to cope with the situation. The teacher looked confused. As it turns out, she was simply unaware of any alternatives.

Too frequently in educational planning we begin by explaining why something can't be done, what resources are unavailable, or which regulation prevents trying out an idea. Such attitudes effectively prevent the serious design and consideration of alternatives. What is first required is a great deal of thinking about ideal programs and resources. One can always cut back as reality demands, but if we never design an ideal program, or think about using new techniques, we will never have a basis for growth and change.

STEP FIVE: SELECTING THE BEST ALTERNATIVE

The selection of the best alternative depends upon inherent values of the community, the school, and the future. It is at this point that the philosophical orientation of the decision-maker becomes relevant. Having determined that the objectives can be accomplished, and that an effective system can be implemented, careful consideration should be given to the extent to which the job is worth doing, and then whether it is worth doing through the use of the most effective or most efficient system.

Teacher education is faced with some real dilemmas. We conjecture that an academic major-minor provides the appropriate "general education" program for an elementary teacher. In fact, we assume that a college of education is the best place to train teachers! And we structure programs based on these assumptions. It is not the present intention to question the value of these assumptions; rather, by pointing to them, we may simply recognize that our <u>assumptions</u> govern our planning and selecting of programs.

Among the assumptions underlying the construction of these elementary teacher education models are positive attitudes towards the use of systems analysis, positive planning for the future, and the value of behaviorism. On a broad level, it is also assumed that teaching, as a process, can be understood (at least in part) and trained for by the models. The models also assume the necessity for total program designs (rather than further changes in the parts) if an adequate view of the future is to be achieved. In short, the models project an inherent faith in the use of the rational processes for the promotion of the humanistic <u>and</u> scientific goals of education. These assumptions appear valid, but the results of their application to operational programs will be the true measure of their value.

STEP SIX: IMPLEMENTING THE SYSTEM

Assuming that sufficient resources are available, systems implementation should be relatively automatic if the system has been carefully designed and tested, but systems procedures include several important aspects of implementation. One is <u>feedback</u>. This effort continues throughout the operation of the system in order to assist three purposes:

1. The continuing effectiveness of the system or the requirement for changes.

2. The continuing relevance of the system in terms of its objectives.

3. The need for the creation of new systems as a result of changing objectives, new developments, or new criteria for selecting alternatives.

Another important aspect of implementation concerns the ability of the institutions to accept new systems. Some universities and colleges of education are unable to make the necessary adjustments; others, seeing the need for change, have undertaken programs to examine the ways and means. The ten models in this study faced the problem in different ways. Florida confined its model to the sphere of control exercised by the school of education. This decision was based on the realities of the campus, and from this base it will be possible to increase involvement. Michigan State, on the other hand, incorporated all the college experiences of its teacher candidates, including academic and general course work. Each model coped with the present situation and points to steps necessary for involving the remainder of the university.

Phase II of the project will indicate the feasibility of implementing the models under various conditions, including available resources, needed personnel and facilities, and requirements for the design and production of new materials. In this respect, the models are incomplete systems descriptions until the implementation procedures have been completed. The models, designed under ideal conditions, will require some redesign to meet the realities of each operational situation. Phase III, the the establishment and operation phase, coupled with the two preceding phases represent a complete system design and implementation project. Only by uniting these aspects can the requisite processes of constant reiteration and adjustments through feedback be adequately fulfilled.

A Total Design Process

The design of an operational system represents only one aspect of a total design process. Frequently, however, systems analysts and educators alike assume that they have dealt with the whole process when the design is completed. The result has been many magnificiently engineered systems which fail to achieve their goals.

There are three elements in a total design process. The first is the conceptualization and design of the operating system which we have discussed. The second is a careful analysis of the environment in which that system is going to operate. The third element is a change and implementation process which will prepare the environment to accept the new system. Each of these three elements has been discussed at great length over the past years, but only infrequently are relationships among them considered.

The elementary teacher education models have sought to achieve total design processes by involving local school districts, industrial groups, and teacher organizations. They have also carefully studied the future roles of the teacher in the schools of tomorrow, and they have stated their concern for educating a teacher who can work in the present and the evolving institution. These elements are extremely important for the success of the models, along with an implementation process which finds them acceptable in the university or college. In this respect, implied in systems design is a concern for the specific situation, and each school of education considering the models, therefore, will need to consider all the elements in the design process.

The Design of Learning Systems

An important application of systems analysis to education has been the design of learning systems. This process is somewhat more limited than

the design of a total program and all its elements, but it has helped produce some significant improvements in curriculum and teaching. In the models the term most frequently used to describe a basic learning system was the learning module. It includes, along with the objectives and the criteria measures, information on necessary resources, experiences, and prerequisites. The following example, from the University of Toledo model, indicates the general format of the learning module:

Number:

Context: EDUCATIONAL TECHNOLOGY

Major Subject Area: Programmed Instruction

Topic: Student Performance Data

Target Population: Elem., In-S., C/U, Admin., Supp.

Behavioral Objectives: 1

The student will define the following types of pupil performance data that he might obtain when his elementary pupils use an instructional program:

a. frame error rate
b. post-test item error rates
c. pre-test and post-test scores and gains;

and he will indicate the significance of each type of data in:

a. evaluating pupil performance
b. evaluating programmed instruction materials.

Treatment:

The student will participate in a lecture-discussion on the topic and then read in depth in resource materials on an individual study basis until familiar with the topic.

Materials:

Glaser, R. (Ed.) Teaching Machines and Programmed Instruction.

Lecture notes, textbooks, reference books and supplementary source materials.

Evaluation:

Competence will be assessed by teacher-made examination.

The modules, of course, represent partial experiences within a general framework of curricular requirements. Once established, the models could then be clustered into groups of experiences which would meet the needs of the particular program. In this respect an ascending ladder is created so that basic experiences can be related to the general goals of the teacher education program. This model, from the University of Wisconsin, shows one form of interrelating the learning experiences:

- Overall system -- a total, time-variant arrangement of input, modification, and output objectives-operations with feedback control and guidance processes, e.g., a teacher education system.
- Component -- a major set of system objectives-operations dealing with either Input, Teaching-Learning, or Output concerns.
- Element -- a subset of a component identifiable by interrelated objectives-operations and or Communicative Arts element in the Teaching-Learning component.
- Subelement -- a subset of an element dealing with a specific set of closely interrelated objectives-operations, e.g., learning to teach reading in the Communicative Arts element.
- Module -- subset of a subelement, e.g., units of instruction devoted to learning how to construct and administer achievement tests in the subelement of measurement and evaluation in the Educational Psychology element.
- Level -- subset of a module where an objective is stated in most specific and final terms which Gage[16] classed as "microcriteria" of teachers" effectiveness, e.g., learning to explain an idea, construct multiple-choice test items, or learning how phonemes are related to graphemes. When there are several modes of instruction to handle a microcriterion, they are called forms.

The learning system, therefore may be thought of an an integrated set of media, equipment, methods, and personnel performing efficiently the functions required to accomplish one or more specific objectives. Most writers acknowledge seven steps in the process of designing learning systems:

1. Preparing the training objectives.
2. Sequencing the objectives of the system.
3. Identifying required functions.
4. Selecting components and procedures.
5. Analyzing cost-effectiveness.
6. Coordinating components and procedures.
7. Evaluating the system.

There is a certain familiar ring about this orderly curriculum design process, but two aspects of it require comment, and I am going to digress at this point to talk about them. The first point is that instructional systems, as they have been developed as parts of total system design, have been based on an analysis of the required performance or acitvity needed by the student after training. The presentation and practice of knowledge in the system are governed by these performance requirements. Such a systematic analysis of present teacher education practices would reveal serious disparities between what is going on in the classroom and what is expected of teachers thereafter.

The Use of Behavioral Objectives

The models rely heavily on the specification of behavioral objectives as a basis for the selection of appropriate knowledge and experiences. Each model includes a description of the teacher's anticipated roles and functions in the changing school. This analysis of the teaching task into more or less specific groups of behaviors forms a basis for

selecting both the academic and pedagogical content and the methods of practicing its application. Using behavioral methods in effect forces the question of relevance by showing direct relationships between the teacher education program and the teacher's classroom performance.

A behavioral objective states the specific actions, or uses of knowledge, which the student will be expected to perform as a result of a training experience. A list of significant behaviors is first derived from an analysis of the teaching process. The more specific this description, resulting from increasingly intensive analyses, the more specific the statement of behavioral objectives. When the behavioral objective has been stated, criterion measures are explicated to specify the kinds of tasks and information which the student will possess as evidence of mastering the objective. When a behavior can be easily analyzed, a behavioral objective and the relevant criterion measures are readily specified. The models indicate that most single teaching behaviors can be described in this manner. For instance,

BEHAVIORAL OBJECTIVE: KNOWLEDGE OF OBJECTIVE TEST CONSTRUCTION

ACTION: The student will prepare a single page example of an objective test in a convenient subject matter.

CONDITIONS: The student will be directed to design an appropriate format and to include at least three different types of objective items.

CRITERION MEASURE: An acceptable test example will:

(1) contain a title and specify the placement of the pupil's name and the date;

(2) specify clear and complete directions to the pupil;

(3) include at least three test-item examples such as true-false, completion, short answer, matching item lists, statements for correction, multiple choice, or problems;

(4) contain no mispelled words and no incorrect grammar.

As behaviors become complex, the statement of behavioral objectives and criterion measures becomes difficult. The analyses of behaviors presented in the ten models clearly indicate the difficulties encountered in trying to understand teaching processes. Some broad areas of teacher behavior can be analyzed, objectified, and described, so that criterion levels of acceptable performance can be stated. On the other hand, the models show that very little research evidence substantiates direct relationships between teacher training activities and role performance. Teaching remains an exceedingly complex activity, and a clear explication of some of the parts should not be taken to imply an understanding of the whole. Nevertheless, the models reflect the present state-of-the-art--in itself a valuable service--while they suggest important frameworks for further research and development.

If the whole of teaching cannot presently be derived from this behavioral analysis of its parts, important directions are nevertheless established for a process of increased control. For instance, if it can be demonstrated that teachers trained in the use of many audio-visual devices and their effective classroom applications are better able to select appropriate individualized learning experiences (presumably because

they are aware of more alternatives), then this evidence recommends significant behavioral objectives for the teacher education program. Again, while the coping skills for dealing with some problem children in the classroom are not fully understood, certain teacher reactions (cynicism, ridicule, severe punishment) have been accepted as counter-productive. In this case, behavioral objectives might specify the elimination of these reactions (and their concomitant attitude structure) from the teacher's repertoire of classroom behaviors. This continuing process of analysis and conscious understanding of teaching behaviors forms a basis for training a teacher who will respond creatively to the teaching situation.

Some Concluding Thoughts on Systems Analysis and Education

As these elementary teacher education models make clear, there is no magic process involved in the use of systems analysis in education. What is required is a hard-headed confrontation with reality--the necessity for producing highly qualified teachers within a framework of scarce resources. Too frequently the use of models, systems analysis, and behavioral objectives seems unwarrented because the processes are too complex, the problems too great, or the money too short. In point of fact, however, if we cannot understand a system, including the system of teacher education and its relation to the whole of education, we are in no position to justify present practices or to recommend changes. Again, if we confine our understandings to parts of the system, rather than to the largest universe of concern, we shall lose the sense of the whole.

An important lesson from the recent legislation for education is becoming apparent: if one part of the system is changed, the whole system must be considered. It is simply not possible to equip a school with audio-visual aides and expect that teachers untrained in their use

will adapt them because they are there. An exceptionally well-trained elementary teacher, the product of one of these models, will not be able to use her skill unless the system--her classroom and school--are prepared to cope with and encourage the use of her expertise. These models have pointed to important directions for planning--difficult ones, at best--but directions worth the attention of educators. Each reader of the models will find fault with some part of them, but that is to be expected. And each institution will find that they make excellent guides for planning and for understanding the implications of plans. They are not, however, prescriptions which can be adopted automatically. The challenge, nevertheless, seems clear.

BUREAU OF RESEARCH

ELEMENTARY TEACHER EDUCATION PROJECT

Copies of these nine reports are now available in hard copy from the Government Printing Office (The Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402) and available both in hard copy and on microfiche from the Educational Resources Information Center (EDRS, The National Cash Register Company, 4936 Fairmont Avenue, Bethesda, Maryland 20014).

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Also available (or to be available soon) are the following related summaries and reports:

- One-page summaries of each of the reports. These may be obtained by writing to the Bureau of Research at the address given below.

- "Nine Proposals for Elementary Teacher Education, A Description of Plans to Design Exemplary Training Programs," by Nicholas A. Fattu of Indiana University. This document is a summary of the nine originally proposed programs which were funded in Phase I of the Project. Available through ERIC (see EDRS address above): ED 018 677. Price: $6.55 for hard copy; $ .75 for microfiche.

- "Analysis and Evaluation of Plans for Comprehensive Elementary Teacher Education Models," by William E. Engbretson of Temple University. This document is an analysis of the 71 proposed but unfunded models of Phase I. Available through ERIC: (ED 027 268)*. Price: $12.60 for hard copy; $1.00 for microfiche.

- A self-initiated critique of the Syracuse University model program; "Specifications for a Comprehensive Undergraduate and In-service Teacher Education Program for Elementary Teachers." Available through ERIC: (ED 027 276)*. Price: $7.20 for hard copy; $ .75 for microfiche.

- "Some Comments on Nine Elementary Teacher Education Models" by Harry Silberman of the System Development Corporation. This paper is adapted from remarks made at an AERA conference in November 1968. Available through ERIC: (ED 029 813)*. Price: $ .75 for hard copy; $ .25 for microfiche.

- A comprehensive bibliography of the reference works used in the preparation of the nine reports (in preparation and to be ready by September). Its more than 1,500 entries include both primary and secondary sources on many phases of teacher education. This document is divided into four sections:

    I. The Nature and Training of Teachers

    II. Education and Educational Practices

    III. Educational Psychology

    IV. Educational Technology

  Compilation of four sections entitled "A Bibliography of References Used in the Preparation of the Nine Model Teacher Education Programs" is available from EDRS (ED 031 460; EDRS Price: MF-$0.50; HC-$4.95).

- The report of a writers' conference jointly sponsored by the ERIC Clearinghouse on Teacher Education and the AACTE in March, 1968 (in preparation and to be ready by September). The Phase I project directors or their representatives gathered in Washington to discuss the procedures and problems of developing their program models. This document is available through EDRS. (ED 034 076; EDRS Price: MF-$1.25; HC-$15.90).

If you would like to receive further information about the teacher education project, please contact:

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