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ABSTRACT

The National Board on Graduate Education (NBGE), founded in 1969, studies the issues facing graduate education, assists those concerned with graduate education in establishing sound policies, and discusses new forms and emphases that must be given to these purposes so that the contributions of graduate education can be enhanced. In this document, the NBGE first examines forces that are currently shaping the future environment for graduate education and then summarizes the principal trends foreseen. Included are recent developments in: (1) the doctoral labor market; (2) federal policy and support; (3) state policy; (4) the graduate community. Also discussed are projected trends in: (1) the labor market; (2) Ph.D. supply; (3) graduate student financial support; (4) new clientele for graduate education; (5) expanded access; and (6) accountability. It is concluded that federal, state, and institutional policies should encourage a more explicit differentiation of function among graduate programs than currently exists. (Author/KE)

Outlook and Opportunities for Graduate Education

The Final Report, with Recommendations, of the

NATIONAL BOARD ON GRADUATE EDUCATION

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Foreword

A brief account of the origins, activities, and reports of the National Board on Graduate Education (NBGE) is given in the Introduction to this volume. This Foreword is a statement of appreciation to those who made the Board's work possible and to others to whom the Board is deeply indebted for professional service and assistance.

Responsibility for general funding for the Board's program was shared by the Carnegie Corporation of New York, The Ford Foundation, the Andrew W. Mellon Foundation, the National Institute of General Medical Sciences, and the National Science Foundation. Technical studies were underwritten by the Carnegie Corporation, The Ford Foundation, the Lilly Endowment, Inc., and the National Science Foundation.

Sponsorship by the Conference Board of Associated Research Councils* stamped the NBGE mission as significant and thus guaranteed a large and important audience for NBGE reports and recommendations. Conference Board members continuously provided encouragement and constructive counsel along the way. Frederick Burkhardt and Robert Lumiansky of the ACLS, Philip Handler of NRC, Roger Heyns of ACE, and Eleanor Sheldon of SSRC gave personal time and attention to NBGE problems and plans and were helpful at all points.

William Kelly, secretary of the Conference Board and Executive Director of the Commission on Human Resources, was an invaluable liaison for NBGE with the Conference Board, its constituent members,

*Composed of the American Council on Education (ACE), the Social Science Research Council (SSRC), the American Council of Learned Societies (ACLS), and the National Research Council (NRC).

and particularly with the National Academy of Sciences–National Research Council, which provided administrative and publication services.

Task forces* were enlisted in the preparation of four reports—*Federal Policy Alternatives toward Graduate Education, Science Development: An Evaluation Study, Minority Group Participation in Graduate Education,* and *Graduate Education and Community Colleges: Cooperative Approaches to Community College Staff Development.* The expertise and scholarship made available to NBGE by the members of these groups assured the quality and authority of the reports. The Board is grateful to them and to others who worked cooperatively with the Board and staff in program planning and as consultants in studies. These included Charles Kidd, executive secretary of the Association of American Universities, Bernard Khoury of the Association of American Universities, and J. Boyd Page, president of the Council of Graduate Schools in the United States.

The authors of the technical reports also are thanked for their contributions to the significance of the Board's work: David W. Breneman, Stephen P. Dresch, David E. Drew, Richard B. Freeman, S. V. Martorana, and William Toombs.

NBGE was most fortunate in having David W. Breneman as staff director. Experienced in higher education studies and gifted as a scholar and administrator, Dr. Breneman brought to his leadership of the Board broad perspective, sound research, and personal qualities that made for morale and productivity within the staff and Board and that contributed to rapport with agencies and leaders whose interest was important to the Board's work. His has been a major contribution to the Board's effectiveness.

The Board is grateful, too, for the dedicated and helpful staff assistance provided by numerous individuals. Sharon C. Bush, staff associate, made valuable substantive contributions to all Board reports and was the staff member with responsibility for the forthcoming report *Minority Group Participation in Graduate Education.* David E. Drew served as project director for the Board's evaluative study of the NSF Science Development Program, one of the Board's major research efforts. Other professional staff included. Edward Allen, Marilyn Block, Joan Creager, Edward Dolbow, Ron Karpf, Larry Mann, Christine Naczkowski, Henry Resnikoff, Charles Sherman, and Robert Snyder.

Mark Nixon served as administrative assistant to the Board during its last two years, and contributed in many ways to the efficient management of the Washington office. Sharon Hardman served effectively for the entire duration of the Board as the chairman's secretary in Urbana. Other

*Members are listed in the Appendix.

administrative staff included Sandra Crowley, David Ewing, Faith Ferguson, Margo Jackson, Renee Licht, Sandra Matthews, Marcia Morrow, and Dorothy Peters.

I express personal thanks to the members of the Board for their patience, for their faithfulness in attention to manuscripts and attendance at meetings, and for their willingness in group discussion to seek consensus and advance group positions. Not every recommendation or exposition was agreed to by every member of the Board, but the reports reflect the deep concern of all with advancing the strength and quality of graduate education as a major component of higher education and as a vital asset in the future welfare of the nation. As their work is terminated, as originally planned, the Board members merit the appreciation of the academic community for their devotion to a professional mission of high importance and for their demonstration of the value of an objective examination of the problems and issues to be confronted in the immediate and long-run future of graduate education. The chapters in the present report entitled "The Outlook," "Recommendations," and "Future Research" suggest the unfinished business that may well serve as continuing agenda for others.

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Introduction

Six years have passed since the National Academy of Sciences sponsored the Conference on Predoctoral Education in the United States that led to the formation of the National Board on Graduate Education (NBGE). It was clear to the participants in that 1969 conference that the relation of graduate education to the broader society was changing and that much uncertainty would accompany the process of adjustment. A resolution adopted by the participants reflected their awareness of the need for change:

> Although graduate education in this country is strong, it can be made stronger and more responsive to national needs. We believe that the demands upon graduate education today cannot be met by simple extension of the trends and practices of the past decade. There is urgent need for serious reconsideration of the mechanisms and form of graduate education in many disciplines. The intensive research experience characteristic of programs which lead to the degree of Doctor of Philosophy is superb preparation for those pursuing careers in basic research. It is increasingly clear, however, that society also needs, and graduate students are seeking, alternative forms of graduate education. New graduate programs must be devised in response to the changing body of knowledge and to our need for persons educated to cope with urgent, newly emerging problems. These matters deserve the concentrated attention of graduate schools, employers, and governmental and private organizations concerned with graduate education.

The participants also recommended that a study commission be formed to provide a means for thorough examination of the issues facing graduate education and to assist those concerned with graduate education in establishing sound policies for the 1970's.

That recommendation was followed, and the Conference Board of Associated Research Councils[1] agreed to sponsor a National Board on Graduate Education. Initial appointments to the Board were made in 1971, and the chairman and staff director were appointed in early 1972. The Board was established for a 3-year period, and since active staff work

[1] Composed of the American Council on Education, the Social Science Research Council, the American Council of Learned Societies, and the National Research Council.

did not begin until June 1972, the termination date was extended to June 1975.

In our first report, *Graduate Education: Purposes, Problems and Potential*,[2] we stated that ". . . graduate education does perform certain essential functions not performed by other institutions, and these functions will endure . . . through and beyond the current period of dislocation."[3] Nothing in our experience during the intervening years causes us to alter that estimate of the fundamental importance of graduate education to American society, and this remains the premise from which we begin. At that time, we identified three basic purposes served by graduate education:

- The education and development of skilled individuals
- The production of knowledge
- The preservation and transmission of knowledge

and argued that each of these purposes contributes importantly to the quality of life in our society. While each of these basic purposes of graduate education remains valid today, one task of this final report is to discuss new forms and emphases that must be given to these purposes so that the contributions of graduate education to our society can be enhanced.

The present report differs from prior NBGE publications in several respects.[4] First, whereas past reports have been limited to a single subject, e.g., federal policy or the labor market for doctorates, several topics are covered here, albeit briefly. Second, this report contains observations on a wide range of issues that have been discussed at Board meetings but that, in several instances, have not been the subject of staff or sponsored research. Chapter 1 reviews the most important developments that have influenced graduate education during the life of the Board; Chapter 2 explores the outlook for the next several years; Chapter 3 presents recommendations; and Chapter 4 develops research agenda of issues that the Board was unable to investigate during its tenure. This report reflects our best judgment about the future of graduate education, and is a "summing up" of our experience over the last 3 years in thinking, discussing, and writing about graduate education.

[2] National Board on Graduate Education, *Graduate Education: Purposes, Problems, and Potential* (Washington, D.C.: National Academy of Sciences, 1972).

[3] *Ibid.*, p. 3

[4] A listing of NBGE publications is included at the end of this report.

Contents

1 Recent Developments

Graduate education and research expanded rapidly during the 1960's, becoming sufficiently large and expensive so as not to be immune to major national and international developments affecting higher education generally. In 1970, over 800,000 students were enrolled in master's and doctoral programs in United States universities, and federal expenditure for research and development (R&D) in universities was more than $1.6 billion. While our earlier reports stressed the financial circumstances of graduate programs and the support of graduate students, it is essential to note that graduate education is only as sound as the universities within which it is conducted. The effects of double-digit inflation and soaring energy costs are felt by all individuals and institutions, and we do not argue that universities are peculiarly or unduly disadvantaged by these events. Universities, however, are less flexible than business firms in adjusting rapidly to abrupt changes in economic circumstances, have not been as successful in finding ways to increase productivity and hence absorb rising costs, and are less able rapidly to pass on cost increases to "customers." It has become increasingly necessary to judge the ability of a university to offer high-quality graduate programs in the context of the total university's financial situation, rather than by attempting to analyze costs of graduate education as if they were separable from the rest of university operations. A major concern of many university administrators today is the difficulty of maintaining quality in graduate programs as more and more of the costs must be met from shrinking university budgets.

The influence of economic recession on higher education is another external factor that has complicated the analysis of trends in graduate edu-

cation over the life of the Board. Recessions in 1970 and 1974–1975 reduced the demand for graduates; affected the decision-making of potential graduate students, and affected federal, state, and private support of higher education. For example, recent reports from graduate deans indicate that an upsurge in applications for graduate school occurred in spring 1975; there is little doubt that this increase is attributable, in part, to the high rate of unemployment nationally and the related difficulty that recent college graduates have experienced in finding jobs. The current recession has also caused some industries to reduce planned R&D expenditures, thus reducing the demand for new Ph.D.'s in the sciences and in engineering. This reduction, in turn, increases the number of new doctorates willing to take relatively low-paying postdoctoral appointments, causing some research investigators to substitute postdoctoral fellows for predoctoral students on research grants, thereby reducing support for current graduate students. As these two examples suggest, trends in graduate education cannot be viewed in isolation from developments in the larger economy, but this fact increases the uncertainty in planning or predicting the course of graduate education.

A more fundamental, although less tangible, change has occurred in recent years in the status of graduate education and research in the hierarchy of national priorities. For several years, roughly spanning the late 1950's through the middle 1960's, research and graduate education were high on the list of priorities; federal support for university-based research grew at an average annual rate of 15 percent; the number of graduate students supported on federal fellowships and traineeships grew to over 50,000; and, through such efforts as the National Science Foundation Science Development Program, an increase in the number and geographical dispersion of high-quality universities was stressed as being in the national interest. In the unique economic, social, and political environment of this period, requests for funds to support graduate education and research did not have to be justified by exacting cost-benefit calculations; instead, there was broad political support for the activities of universities, and many states supplemented the federal effort by expanding existing institutions and funding the creation of new universities. Graduate enrollments grew during the 1960's at an average annual rate in excess of 10 percent, and the number of doctorates awarded tripled during the decade, from approximately 10,000 to 30,000 annually.

The abrupt reversal of these trends in social support, beginning in the late 1960's and continuing to the present, has been widely noted and amply documented in prior Board reports and elsewhere.[5] Federal fellow-

[5] National Board on Graduate Education. *Federal Policy Alternatives toward Graduate Education* (Washington, D.C.: National Academy of Sciences, 1974); and National Science Board, *Science Indicators 1972* (Washington, D.C.: United States Government Printing Office, 1973).

ships and traineeships have been rapidly and dramatically reduced, the growth in federal support for basic research has been sharply curtailed, and the virtually unquestioning support of advanced education and research has been replaced by a skeptical attitude toward the value of these activities. National priorities in higher education (as a part of postsecondary education) shifted to concern for equality of educational opportunity, stressing access for every qualified student to some form of postsecondary education. At both the state and federal level, graduate education and research became lower priority concerns.

It is not our purpose here to analyze the reasons that contributed to the declining status of research and graduate education, but merely to assert this decline as a brute fact that must be considered in looking to the future. These activities do not have large or vocal constituencies that can be counted upon to lobby effectively when political support is low; by its very nature, graduate education will involve only a fraction of the populace directly, and individual, federally supported, research projects are often difficult to explain to the broader public and hence can be subjected to ridicule by individuals seeking headlines. There is, however, more detailed evidence regarding the shift in public support, and we review these developments briefly as part of our examination of trends in graduate education to 1975.

RECENT DEVELOPMENTS IN THE DOCTORATE LABOR MARKET

During the 1970's, the labor market for new doctorates has generally continued to shift from conditions of excess demand to excess supply, although with considerable variation among disciplines. One index of this change is reflected in the responses of new Ph.D. recipients each year to the National Research Council Survey of Earned Doctorates questionnaire. One survey item records the number of new degree recipients who are actively seeking work but have no specific employment prospects at the receipt of the degree. Table 1 records the trend in this response over the 6-year period, FY 1968–1973, in five major disciplines. Note that in each field, the percentage of graduates reporting employment difficulty in FY 1973 was larger than in FY 1968 by at least a factor of 2; however, the differences among fields are equally pronounced, as a comparison of the figures in economics and English make clear. The data also demonstrate another difference among fields, in that the proportion reporting placement difficulty declined between FY 1972 and 1973 in electrical engineering and in chemistry, fields that place a substantial proportion of new graduates in industry; employment prospects in such disciplines are subject to the volatility of the business cycle, a factor of less significance in the primarily academic fields.

TABLE 1 Proportion of New Ph.D. Recipients Reporting No Specific Employment Prospects at Receipt of the Degree, by Discipline and Year (5 disciplines)

	Percent, by Fiscal Year					
Discipline	1968	1969	1970	1971	1972	1973
Chemistry	4.5	7.8	11.4	15.2	18.9	17.2
Economics	3.1	3.3	4.6	6.1	6.3	6.4
Electrical engineering	7.1	10.7	11.6	19.6	18.4	15.0
English	3.9	7.9	9.3	13.2	15.5	21.5
Psychology	6.1	8.0	8.8	10.0	12.3	13.6

SOURCE: Data from NRC Doctorate Records File.

In a report prepared recently for the Council of Graduate Schools,[6] Raymond P. Mariella and John W. Ryan presented results of a survey sent to 19 national associations concerned with the various academic disciplines. Their principal conclusions are worth noting:

> Although the responses received from the various professional associations are somewhat fragmentary and do not answer all of the questions posed, certain patterns emerge with a degree of commonality. It is obvious from analyzing the responses that most of the professional associations contacted have only begun to grapple with the problem of supply and demand and related problems of employment and underemployment of Ph.D.'s.
>
> In examining the responses, it becomes apparent that there is a lack of agreement as to whether an unemployment problem truly exists. Some professional groups feel that there is no unemployment problem, while others are aware of a current problem or foresee serious problems in the future.
>
> Finally, an important aspect of the survey is the absence of significant and desirable data concerning all disciplines. This situation leads to a great deal of speculation on the part of many and tends to confuse the issue as to whether there is an oversupply of Ph.D.'s. The data available suggest that certain disciplines, particularly in the social sciences, are oversaturated or quickly reaching this point in terms of academic opportunities, however, the same cannot be said of health-related disciplines. Among these latter, no serious unemployment problem appears to exist and respondents foresee a favorable employment climate in the future.

In January 1975, the American Council of Learned Societies surveyed 143 of the highest-rated humanities departments regarding the circumstances of students awarded the Ph.D. in 1974. Results of this survey are presented in Table 2. Approximately 50 percent of the new doctorates had received new teaching jobs and nearly 16 percent were in continued teaching jobs, while 16 percent were reported as unemployed and 8 percent were reported as whereabouts unknown.

[6] Raymond P. Mariella and John W. Ryan, "The Supply and Demand Situation: A Summary Review" (Washington, D.C., Council of Graduate Schools in the United States, 1974).

TABLE 2 Circumstances of Ph.D. Recipients in 1974, Selected Disciplines

Discipline	Number of Departments Queried/ Responses	Total Number of Ph.D.'s	New Teaching Jobs	Continued Teaching Jobs	Non-teaching Jobs	Unem-ployed	Where-abouts Unknown	Other[a]
Classics	17/16	57	33	8	5	5	2	4
English	29/27	531	227	109	43	69	74	9
French	21/18	112	62	14	4	25	7	—
German	21/21	91	48	14	10	13	4	2
History	25/21	427	229	38	48	74	24	14
Philosophy	19/18	145	69	32	15	20	4	5
Russian	11/11	37	21	5	2	7	1	1
Totals	143/132	1,400	689	220	127	213	116	35

SOURCE: American Council of Learned Societies.

[a]Includes Ph.D.'s not seeking employment, continuing as students, holding research fellowships, or deceased.

The current employment situation in the sciences and in engineering was discused at a Symposium on the Human Resources of Science and Engineering during the 1975 annual meeting of the American Association for the Advancement of Science.[7] As the data cited earlier indicate, the situation differs from discipline to discipline, from the strong current demand in the geosciences, arising from the energy crisis, to the weak demand in pure mathematics, a field largely dependent upon the academic market. In general, those fields that are heavily dependent on academic placements for new Ph.D.'s have experienced the most labor market difficulty in recent years. The unemployment rate of the total doctorate-holding labor force of an estimated 229,400 scientists and engineers, however, was reported at only 1.2 percent in 1973,[8] indicating that the difficulties experienced by recent graduates are not endemic to the entire age and experience range.

The serious policy issue for new Ph.D.'s is not unemployment, however, but underemployment. The high "unemployment" rates that recent surveys report for new doctorates reflect the extended job search that these individuals undertake in looking for work related to their advanced education. If such positions cannot be found, the vast majority of new doctorates will find work that does not draw directly on their specialized training, and it is the evaluation of that outcome that requires public attention.

It must also be remembered that the placement experience of new Ph.D.'s described above refers to those doctoral students that began graduate study in the late 1960's, before the changing market forecasts were widely known. For insight into the response of potential graduate students to the declining market, one must turn to trends in first-year graduate enrollments. In our 1973 report, *Doctorate Manpower Forecasts and Policy*,[9] we called attention to the fact that between 1970 and 1971, first-year graduate and professional enrollments increased by only 0.1 percent and that substantial shifts were occurring away from enrollment in many arts and sciences disciplines and toward such professional fields as law, medicine, business, architecture, and city planning. We argued that these trends were evidence of student responsiveness to changing

[7] Scientific Manpower Commission, *The Human Resources of Science and Engineering, Today and Tomorrow* (Washington, D.C., American Association for the Advancement of Science, 1975).

[8] Commission on Human Resources, National Research Council, *Doctoral Scientists and Engineers in the United States, 1973 Profile* (Washington, D.C.: National Academy of Sciences, 1974).

[9] National Board on Graduate Education, *Doctorate Manpower Forecasts and Policy* (Washington, D.C.: National Academy of Sciences, 1973).

TABLE 3 First-Year Graduate Student Enrollment, Four Fields, by Fiscal Year, 4,112 Departments

Field	1971	1972	1973	Percent Change, 1971–1973
Engineering	20,659	19,330	20,238	− 1.8
Physical sciences	15,559	15,055	14,612	− 6.1
Life sciences	10,992	11,486	12,110	+10.2
Social sciences	15,234	14,461	13,689	−10.1

SOURCE. *Graduate Science Education, Student Support and Postdoctorals, Fall 1973,* Detailed Statistical Tables, Appendix III, NSF-74-318A (Washington, D.C.: NSF, 1974).

labor markets, with shifts away from fields in relative excess supply toward those in excess demand.

The comprehensive graduate and professional enrollment data used in that report were collected by the U.S. Office of Education, and, unfortunately, data for more recent years are not yet available from that source. Certainly the enrollment pressure on professional schools has shown no sign of abating, while trends in the graduate arts and sciences areas, as best they can be pieced together, show considerable variation. National Science Foundation surveys provide one source of information on enrollment trends: Table 3 contains data on first-year graduate enrollments from 1971 to 1973 in 4,112 matched science and engineering departments, aggregated into four disciplinary categories.

The decline in engineering and physical sciences continues a trend in those fields that extends back several years; first-year graduate enrollments in physics, for example, began to decline in the mid-1960's. The life sciences continue to grow, reflecting in part increased student interest in the health-related disciplines and in environmental studies. The drop in social science enrollments differs from the trend reported by the Council of Graduate Schools (CGS) in its enrollment surveys,[10] since CGS reported increases in first-time social science enrollments over this period. One important difference in the two surveys is the inclusion in the CGS survey of business and history as social science disciplines; the rapid growth of graduate business enrollments in recent years may explain much of the discrepancy. In two areas not covered by the NSF surveys, the humanities

[10] Robert A. Altman, "Report on the Council of Graduate Schools—Graduate Record Examinations Board 1972–73 Survey of Graduate Enrollment," *Proceedings of the 12th Annual Meeting of The Council of Graduate Schools in the United States,* Nov. 29–Dec. 1, 1972 (Washington, D.C., Council of Graduate Schools), and reports of the 1973–1974 and 1974–1975 surveys, published in the proceedings of the 13th and 14th annual meetings of the Council of Graduate Schools, respectively.

and education, CGS reports small increases in first-time graduate enrollments in the humanities and large increases in education enrollments.

Both the NSF and CGS surveys have drawbacks for tracing time trends in first-year graduate enrollments by discipline: the surveys differ in coverage, in discipline definition, and in response rate. What does seem clear, however, is that student enrollment response to a declining labor market differs significantly across disciplines, from the marked decline in physical sciences and engineering, to the lesser decline or even slight increases in social sciences and humanities, to the large increases in the field of education. When comprehensive enrollment data are available from the Office of Education for these more recent years, it will be important to see whether simple economic theories of student behavior can be squared with the differential enrollment trends among disciplines.

In addition to enrollment response, a second factor must be considered in interpreting the supply side adjustments of the labor market—the proportion of entering students that ultimately earn the doctorate. Charles Kidd has pointed out that the ratio of Ph.D.'s awarded to first-time graduate enrollments 4–7 years earlier has declined significantly in recent years, the ratio falling from a peak of .163 in 1970 to .116 in 1973. During the 1960's, this degree/enrollment ratio had been remarkably stable, at approximately .15. Kidd notes the significance of this change: "If the 15 percent ratio of the 60's had held up, 43,500 Ph.D.'s rather than 33,700 would have been awarded in 1973."[11] Several factors may account for this trend—a growing proportion of first-year graduate students may be terminal master's degree aspirants; reduced financial support may be causing greater attrition; graduate departments may be tightening standards for the Ph.D.—but whatever the cause, this situation suggests that Ph.D. production several years hence will not be so large as simple extrapolation from recent first-year graduate enrollments might indicate.

These data suggest that a substantial, although varied, supply response is under way in the doctorate labor market. In the next chapter we shall relate these trends to demand projections and discuss in some detail the different adjustment problems we foresee facing the various broad disciplinary groupings. But, first, we need to consider other recent events.

RECENT DEVELOPMENTS IN FEDERAL POLICY AND SUPPORT

The rapid growth of federal support for research, for graduate students, and for selected institutional programs made possible the enormous ad-

[11] Charles V. Kidd, "An Overview of Projections and the Supply Side," unpublished paper prepared for the Seminar on Scientific and Technical Manpower Projections, sponsored by the National Science Foundation, Hot Springs, Virginia, April 17, 1974.

TABLE 4 Federal R&D Expenditures in Universities and Colleges, by Fiscal Year

Fiscal Year	Constant-Dollars[a]	Amount ($ millions)	Fiscal Year	Constant Dollars	Amount ($ millions)
1955	186	169	1970	1.226	1.658
1960	392	405	1971	1.220	1.724
1965	968	1.073	1972	1.258	1.838
1966	1.108	1.262	1973	1.315	2.030
1967	1.198	1.409	1974	1.252	2.130
1968	1.285	1.572	1975	—	2.224[b]
1969	1.248	1.600	1976	—	2.278[b]

SOURCE. National Science Foundation, *National Patterns of R&D Resources, 1953–1974* (Washington, D.C., U.S. Government Printing Office, 1974), estimates from U.S. Office of Management and the Budget, *Special Analyses, Budget of the United States Government, Fiscal Year 1976* (Washington, D.C.: U.S. Government Printing Office, 1975), p. 267.

[a]1958 constant dollars; GNP price deflator was used to convert current to constant dollars.
[b]Estimate.

vances in both quantity and quality of graduate program offerings in the post-World War II period; this explains the vital importance of federal policy to graduate education and the concern with which changes in that policy are viewed by those involved in graduate education. Because of the importance of this subject, NBGE prepared a separate report, *Federal Policy Alternatives toward Graduate Education*, [12] released in January 1974, that dealt extensively with this topic. This section will simply update a few key data items and note other developments influencing federal policy that have occurred in the intervening period.

In 1955, the total national R&D effort from all funding sources was $6.2 billion and represented 1.6 percent of GNP: by 1967, expenditures had risen to $23.6 billion, totaling 3.0 percent of GNP. Since then, expenditures have grown more slowly, and the proportion of GNP devoted to R&D has declined steadily, reaching 2.3 percent in 1974, at an expenditure of $32.1 billion.[13]

Federal R&D expenditures in universities also increased dramatically from the mid-50's to the mid-60's, but they have increased at a much slower rate in recent years, as Table 4 indicates.

During the mid-1960's, federal funds supported 60 percent of the total

[12] National Board on Graduate Education, *Federal Policy Alternatives toward Graduate Education* (Washington, D.C.: National Academy of Sciences, 1974).
[13] National Science Foundation, *National Patterns of R&D Resources, Funds and Manpower in the United States, 1953-1974*, National Science Foundation 74-304 (Washington, D.C.: United States Government Printing Office, 1974), pp. 20–21.

university R&D effort; by 1974, this percentage had declined to 55 percent.[14] In addition, the distribution between basic and applied research has shifted in recent years, with universities reporting that an increasing proportion of federal funds are supporting applied research, although basic research still accounts for over 70 percent of the total university effort. The distinction between basic and applied research is hardly precise, but the trend of recent federal policy has been to stress projects that promise a more immediate payoff.

The wisdom of this shift in policy is hotly disputed, and we are in no position to add substantively to that argument in this report. Two points do seem clear, however. First, a balance must be struck between the two types of research, since successful applied research presumes the existence of a steady stream of basic research findings; we can point to several ambitious attempts to apply science (including social science) to specific problems before a body of tested research findings has been established, and the resulting failures not only waste resources but add to the skepticism with which science is viewed in some quarters.[15] Second, at some point, applied research projects in which graduate students participate begin to conflict with the educational purpose of graduate education, particularly when a graduate student becomes little more than an employee on a project in which increased understanding of the subject is not the focus. Universities must judge when a project has lost its educational value, and reject activities that can be better carried out by non-university contractors.

In graduate student support, the trend toward virtual elimination of doctoral-level federal fellowships and traineeships continues, with little change from our earlier report. The Federal Interagency Committee on Education (FICE) assembles data from all federal agencies on the number of graduate students so supported, and their most recent figures show that in FY 1974, 18,472 graduate students received federal fellowships and traineeships, down from a high of 51,446 in FY 1968.[16] [The FICE figures do not include graduate students supported on National Institute of Health/Alcohol, Drug Abuse, and Mental Health Administration (NIH/ADAMHA) training grants, for these grants contribute to the support of the total research and training environment in addition to providing graduate student support.] The majority of the 18,472 reported in FY 1974, how-

[14] National Science Foundation, *Survey of Scientific Activities of Institutions of Higher Education*, unpublished data provided by the National Science Foundation.
[15] See, for example, Garry D. Brewer, *Politics, Bureaucrats and the Consultant* (New York: Basic Books, Inc., 1973).
[16] Federal Interagency Committee on Education, *Report of Federal Predoctoral Student Support* (Washington, D.C., United States Government Printing Office, 1970), and unpublished data for recent years.

ever, are terminal master's degree candidates supported under professional degree programs of the U.S. Office of Education (8,275 students supported in special education programs to prepare teachers for the handicapped), the Social Rehabilitation Service (over 3,000 students supported, primarily at the master's level), and the Health Resources Administration (over 2,100 supported at the master's level).[17] In terms of doctoral student support, therefore, only an estimate can be made, but the number of supported students could be as low as 3,000 or as high as 8,000, with the actual figure most likely in the lower end of the range.

The NIH/ADAMHA training grants are the major source of federal support for students at both the predoctoral and postdoctoral levels in the biomedical and behavioral science disciplines. In recent years, the Administration has sought to eliminate the training grants as a source of predoctoral support, but the Congress has consistently reinstated them in the budget. Consequently, although there has been continuing uncertainty, complicated by impoundments and later release of funds, approximately 6,000 to 8,000 full-time predoctoral students have received support annually under these programs during the 1970's.[18]

The federal government is also the principal source of support for graduate research assistantships. In our earlier report on federal policy, we reported that between 1969 and 1972 there was a slight decline (3.3 percent) in the number of graduate students supported as research assistants; the most recently published NSF Survey of Graduate Science Student Support reports that between 1972 and 1973 the number of graduate students supported on research assistantships increased slightly (1.9 percent), although the federal component of such support declined by 2.2 percent.[19] These data indicate that research assistantships have been essentially stable in number from 1969 to 1973 and have not been a growing source of graduate student support in absolute terms (although, of course, their relative importance has increased).

The GI Bill has become in recent years the major source of federal support for graduate students. Table 5 presents data collected by the Veterans' Administration on both number of graduate and professional students supported and the total amount of funds provided for that pur-

[17] Data provided by staff of the Federal Interagency Committee on Education.

[18] National Institutes of Health, *Basic Data Relating to the National Institutes of Health*, 1975 (Washington, D.C.: United States Government Printing Office, 1975), p. 43, and Commission on Human Resources, National Research Council, *Personnel Needs and Training for Biomedical and Behavioral Research* (Washington, D.C.: National Academy of Sciences, June 1975), p. 34.

[19] National Science Foundation, *Graduate Science Education, Student Support and Postdoctorals, Fall 1973*, Detailed Statistical Tables, Appendix III (Washington, D.C.: National Science Foundation), p. 91.

TABLE 5 Veterans' Administration Graduate and Professional Student Support, by Fiscal Year

Fiscal Year	Total Graduate Students (thousands)	Total Graduate Student Support ($ millions)
1969	99.3	81.1
1970	122.7	120.5
1971	146.1	177.9
1972	170.4	210.0
1973	181.3	283.9
1974	189.3	307.2
1975[a]	202	370
1976[a]	180	348

SOURCE. VA Information Bulletin, *Veterans Benefits under Current Educational Programs*, June 1974, p. 25. 1975–1976 figures from *Special Analyses, Budget of the United States Government, Fiscal Year 1976* (Washington, D.C. : U S. Government Printing Office, 1975).

[a]Estimate.

pose. By FY 1974, the VA reported that over 189,000 graduate and professional students—approximately 20 percent of the total enrolled—received GI Bill benefits in excess of $307 million. Of this number, approximately 47,000 students (25 percent) were enrolled in law and medical schools, leaving over 142,000 students in arts and sciences and other professional programs. The President's FY 1976 budget projects the number of graduate and professional students supported under this program to peak in FY 1975 at 202,000, falling to a projected 180,000 in FY 1976.[20] The number of students supported will fall off rapidly in subsequent years as the number of eligible veterans declines. These funds have played a central role in keeping graduate and professional enrollments up during the 1970-1975 period, and their loss will remove the major current source of federal support for graduate and professional students.

Graduate student borrowing under the various federally insured loan programs has increased in recent years, although remaining an approximately constant 10 percent of the number of loans made.[21] To the best

[20] United States Office of Management and the Budget, *Special Analyses, Budget of the United States Government, Fiscal Year 1976* (Washington, D.C.: United States Government Printing Office, 1975), p. 151.

[21] United States Office of Education, Office of Planning, Budgeting and Evaluation, *GSLP Loan Estimation Model, Borrower, Lender and Institutional Characteristics*, Vol. II (Washington, D.C., unpublished report available from U.S. Office of Education, 1974)

of our knowledge, there have been no studies made of the individual accumulation of debt from undergraduate and graduate study, although the data are available in the U.S. Office of Education, Division of Insured Loans. Furthermore, very little is known about the degree of difficulty graduate students face in acquiring loans and about the effect of loan finance on student enrollment decisions. Since student borrowing seems likely to be an ever-increasing component of graduate student support, the absence of empirical studies on the effects of this form of finance is a serious gap in our knowledge.

Apart from the level of federal support, an equally important issue concerns the distribution of federal research and student support funds among institutions. Table 6 reports the changes in concentration of federal R&D funds among universities from 1964 through 1974. Note that the share of the 10 institutions receiving the most federal money declined steadily until 1969, remained stable at approximately 27 percent through 1973, and dropped to 24.4 percent in 1974. The share of the next 20 institutions was essentially unchanged over the entire period at roughly 26 percent, while the share of all other universities increased until 1969, remained at approximately 47 percent through 1973, and increased slightly to 49.3 percent in 1974. The share going to the leading institutions, therefore, has not been diluted significantly during the recent years of reduced growth in federal R&D expenditures; instead, the major dilution that did occur was a product of the rapid growth years in the 1960's.

Similar results have been reported regarding the distribution of federal support for graduate students by quality rating of graduate program. Although the number of federally supported graduate students declined markedly between FY 1968 and FY 1973, the highest rated departments slightly increased their proportion of students with federal support over this period.[22] Consequently, recent federal policy has not affected the highest-rated programs disproportionately.

A brief section in the Special Analyses of the Federal Budget for Fiscal 1976 discusses federal outlays for higher education by type of institution—2-year, other undergraduate, and graduate and professional. This section captures in a summary fashion the declining priority of graduate education relative to undergraduate education in the Administration's proposed budget, and hence bears quotation:

> There is a shift in the level of educational institutions benefiting from federal education expenditures. Outlays for 2- and 4-year institutions will increase $1.4 billion from 1974 to

[22] David W. Breneman, *Graduate School Adjustments to the "New Depression" in Higher Education*, Technical Report No. 3, National Board on Graduate Education (Washington, D.C.: National Academy of Sciences, 1975), p. 36.

TABLE 6 Concentration of Federal Support of R&D in Selected Groups of Universities, 1964–1974

Institution Group	Percent of Total Expenditures										
	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
First 10 (1–10)	32.0	30.2	30.0	29.6	28.4	27.1	27.8	27.4	27.4	27.1	24.4
Second 20 (11–30)	26.1	26.4	25.6	26.3	25.5	26.6	25.4	25.6	25.4	25.6	26.3
All other	41.9	43.4	44.3	44.1	46.1	46.3	46.7	46.9	47.3	47.3	49.3

SOURCE: National Science Foundation, *Federal Support to Universities and Colleges and Selected Non-Profit Institutions*, annual publications.

1976, almost entirely accounting for the increase in federal outlays for higher education over the 2-year interval.

More than half of higher education funds, $4.1 billion, are estimated to go to 4-year undergraduate institutions in 1976. Of the remainder, $2.0 billion will go to 2-year institutions and $1.3 billion to graduate and professional schools.[23]

We conclude this review of recent trends in federal policy with a few brief comments on developments within selected agencies that influence graduate education. These comments are necessarily impressionistic rather than comprehensive, but we believe they reflect accurately the situation in spring 1975.

National Institutes of Health

Funds obligated for subsidies, grants, and contracts (i.e., funds for which universities can compete) totaled $1.32 billion in FY 1974, fell to an estimated $1.07 billion in FY 1975 (−19 percent), and are included in the FY 1976 budget request at $1.1 billion.[24] When inflation is taken into account, the drop in real terms is substantially larger than these current dollar figures indicate. NIH training grants averaged approximately $130 million in the early 1970's, but the Administration's FY 1976 budget request declined to approximately $87 million. At that level, the majority of the FY 1976 funds would support continuing trainees rather than new graduate students.[25] The National Research Act,[26] signed into law in summer 1974, terminated the existing authority for training grants on June 30, 1975, with the amount and distribution of subsequent grants to be determined each year on the basis of estimated national manpower needs. The National Academy of Sciences was requested in the legislation to prepare this annual estimate of need, and the process is so new, it is difficult to predict what future levels of awards will be.

National Science Foundation

This agency remains a strong source of support for various aspects of graduate education, including support for basic research, seminars,

[23] United States Office of Management and the Budget. *Special Analyses, Budget of the United States Government, Fiscal Year 1976* (Washington, D.C.: United States Government Printing Office, 1975) p. 150.

[24] Data provided by United States National Institutes of Health.

[25] Commission on Human Resources, National Research Council, *Personnel Needs and Training for Biomedical and Behavioral Research* (Washington, D.C.: National Academy of Sciences, June 1975), p. 26 and p. 36. Data for FY 1976 provided by U.S. National Institutes of Health.

[26] Public Law 93-348, 93rd Congress, H.R. 7724, July 12, 1974.

travel, fellowships, and research assistantships. NSF's nationally competitive predoctoral fellowship program has stabilized at 500 new starts per year; recent attempts to increase that number have been unsuccessful. A small program of energy-related traineeships was recently begun. The critical mood in Congress toward basic research flared up in the surprising passage by the House of Representatives in April 1975 of the Bauman Amendment to the NSF authorization, which would require the Foundation to submit lists of proposed research projects to Congress every 30 days for review before approval. Although not enacted into law, this episode caused Dr. Guyford Stever, Director of the Foundation, to observe that "Times are changing; I think the scientific community should be realistic about that."[27] Congress and the public are asking what they are getting for their money spent on research. Stever went on to state that the Bauman Amendment is " . . . a bigger turning point than the Mansfield amendment,"[28] which altered the Department of Defense policies for expenditure on basic research.

National Endowment for the Humanities

This relatively new agency has not yet demonstrated any significant institutional concern for the vitality of humanities graduate education comparable, for example, to the role that the National Science Foundation plays with respect to graduate science education. The agency has thus far rejected all recommendations that it begin a modest program of competitive predoctoral fellowships in the humanities, complementing the NSF fellowship program in the sciences. NEH has begun to take tentative steps, however, to support the collection of data on doctoral programs in fields under its purview, which will allow studies of graduate education to cover all fields, not just the sciences (NSF has for years supported an active data collection effort on trends in graduate science education).

U.S. Office of Education

The termination of the NDEA Title IV Fellowship program, administered by USOE, largely eliminated this agency from active concern with specific graduate programs. Graduate students borrow under the Guaranteed Student Loan Program and the National Direct Student Loan Program, both administered by USOE, but these are not primarily graduate programs. The remaining Title IV programs administered by this agency are

[27] "News and Comment," *Science*, Vol. 188, No. 4186, 25 April 1975, p. 339.
[28] *Ibid.*

almost exclusively directed toward undergraduate student aid, leaving this agency with virtually no focus on graduate education. Similarly, the Congressional committees that are directly concerned with USOE programs, the Subcommittee on Education of the Senate Committee on Labor and Public Welfare and the Subcommittee on Postsecondary Education of the House Education and Labor Committee, have paid essentially no attention to graduate education in recent years.

Office of Management and the Budget

The dominant view expressed by this key agency in recent years is that graduate education is a form of investment in human capital, with the benefits primarily private, not social. Consequently, in this view, there is little justification for federal subsidy in the form of fellowships; instead, the student-investor should pay for his/her own education, borrowing if necessary or working as a research or teaching assistant. With regard to the support of research, universities are viewed as one among many types of competing institutions that can provide useful information to mission-oriented federal agencies. Research results are a commodity that the agencies can purchase as necessary from universities or any other competent supplier.

A Final Comment

The changes in federal policy and financing noted above have had many effects on graduate education and research, some of which have been noted in prior NBGE reports.[29] We wish to highlight here one further issue that is emerging at the graduate level as a result of the reduced federal support for graduate students—the growing significance of tuition differentials between public and private universities and the influence of these price differences on student enrollment decisions. One of the major, although probably inadvertent, effects of the federal policy decision to reduce subsidy of graduate students has been to place the private universities in an increasingly difficult competitive position on the basis of price. We discuss this issue further in Chapter 3, but we believe that this important side effect of federal policy should be mentioned here as well.

[29] National Board on Graduate Education, *Federal Policy Alternatives toward Graduate Education* (Washington, D.C., National Academy of Sciences, 1974), and David W. Breneman, *Graduate School Adjustments to the "New Depression" in Higher Education*, Technical Report No. 3, National Board on Graduate Education (Washington, D.C., National Academy of Sciences, 1975).

DEVELOPMENTS IN THE STATES

Issues of accountability, costs, efficiency, program evaluation, and duplication of effort have been the dominant themes in most state discussions of graduate education in the 1970's. In several states, graduate programs in public universities have been phased out on the basis of statistical evaluations of low degree productivity, in others, no new graduate programs have been allowed. The State Department of Education in New York began a detailed review of doctoral programs, field by field, eliminating those programs judged to be lacking in quality. The California Department of Finance submitted doctoral programs within the University of California to intense scrutiny of time-to-degree and attrition, comparing the U.C. system to several other universities on these productivity measures[30], a major change in the state's budgeting system was proposed as a result of this analysis. In Missouri, Governor Christopher Bond called for creation of an academic common market among states in that region to reduce the number of doctoral programs required in each state. These are but three examples of the types of action being taken in the states that, coupled with the declining role of the federal government, enhance the importance of state policy in shaping graduate education. Constraints of time and resources made it impossible for NBGE to undertake or to sponsor a thorough study of trends in state policies toward graduate education, in this brief section, we draw on two recent reports sponsored by the Education Commission of the States (ECS) for further insight into trends and issues at the state level.

Comparative data over time on state expenditures for higher education by institutional type are notoriously unreliable because of changing categories and definitions, but a recent survey by Lyman Glenny and James Kidder provides evidence that public advanced graduate universities have received a steadily declining *proportion* of total state appropriations for higher education institutions over the period 1963–1973,[31] as Figure 1 shows.

A recent ECS Task Force report, *The States and Graduate Education*, stressed the following points[32]:

[30] 'Quality and Productivity in Graduate Education at the University of California. Budget Policy Recommendations.' Report PR-92 (Sacramento, California, State Department of Finance, June 1974).

[31] Note that Figure 1 reports the proportion of state appropriations received, not the absolute amount, nor are the data normalized for enrollments.

[32] Education Commission of the States, Task Force on Graduate Education, *The States and Graduate Education*, Report No. 59 (Denver, Colorado, Education Commission of the States, 1975).

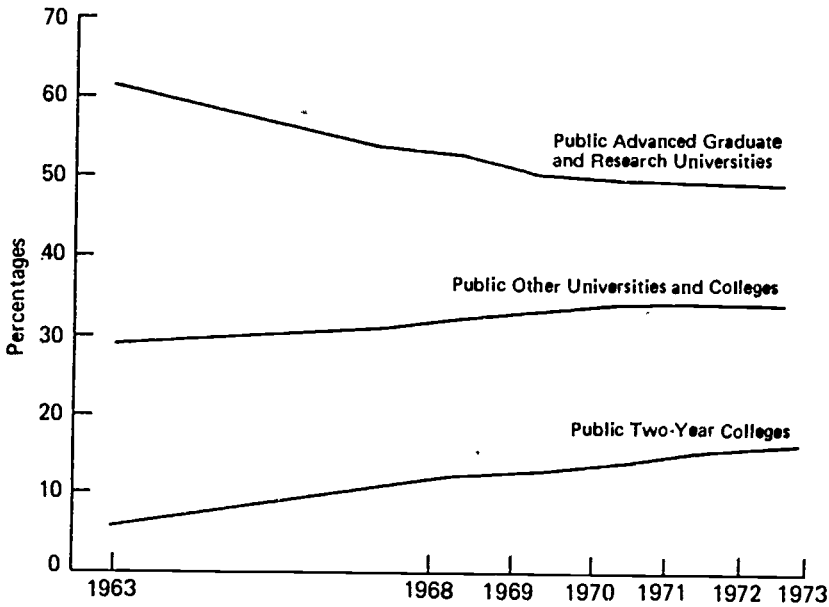


FIGURE 1 Total state appropriations for institutional types (public) as a percentage of total state appropriations for public institutions of higher education: United States (1963–1973). SOURCE: **Lyman A. Glenny and James R. Kidder, *State Tax Support of Higher Education: Revenue Appropriation Trends and Patterns 1963–1973* (Denver, Colorado: Education Commission of the States, April 1974) p. 16. Reprinted with permission of the Education Commission of the States.**

- Graduate education, including research, is essential to the welfare of the states and the nation.
- If our valuable resources in graduate education and research are to be wisely husbanded and their quality protected and enhanced, it is essential that an effective institutional, state, and federal partnership be developed.
- The states have primary responsibility for the basic institutional support of both graduate and undergraduate programs in their public universities. The federal government should have primary responsibility for support of research, graduate students and programs of major national import.
- The states should develop effective qualitative and quantitative criteria for review of existing graduate programs, elimination of programs, and approval of new programs.
- The state agency in cooperation with institutions and programs should encourage the development of consortia for shared resources among both public and private institutions within the state and region. Regional planning and sharing among states in the use of resources in graduate (and professional) education and research are essential.
- The unique role of institutions with primarily national orientation can and should be recognized and provided for.
- Since federal research funds, programmatic and institutional funds, and student funds have a direct impact on institutional role and scope and thus on state support, it is crucial

that the states not only be consulted but be involved in federal institutional policy development, legislative consideration and development and implementation of guidelines.

- States have a major responsibility through the appropriate state agency in cooperation with the institutions to review and fund graduate programs and research. Such review and funding should be done in the light of reasonable criteria, taking into account diversity, need, quality, and output.
- There can be little justification at the present time for new doctoral programs that duplicate existing ones and for which a pressing need cannot be demonstrated.

These issues, which, with varying degrees of emphasis, are under discussion in most states, are fundamentally related to the difficult adjustment process from an era of rapid growth and high priority accorded to graduate education to one of diminished growth and lower priority. Our greatest concern is the potential damage to graduate education that could occur if states succumb to political pressures or adopt simplistic evaluation methods that fail to assess differences in purpose and in quality among graduate programs. *We strongly believe that excellence in scholarship, research, and graduate education, where it currently exists, should be maintained and enhanced, and that graduate programs with an applied, practitioner focus, serving the needs of new clientele groups with different interests from the traditional doctoral student, must also be provided.* There is a clear and pressing need for greater and more explicit differentiation of function among graduate programs in the United States, with different evaluative criteria applied to programs with different purposes and missions; state policies will be critical to this outcome.

DEVELOPMENTS WITHIN THE GRADUATE COMMUNITY

An activity as large, complex, and varied as graduate education obviously defies simple summary judgments regarding changes in its status. Graduate education is conducted in several hundred universities and in several thousand academic departments and other forms of organization within those universities, most program decisions are decentralized to the departmental level, or even to subdepartmental units organized by specialty, and in most disciplines there are no external accrediting agencies that specify or evaluate program content or quality. In this circumstance, it is not surprising that the norms and standards established by the academic disciplines themselves should be largely controlling in determining the nature of graduate education in English, economics, physics, and so forth. In most fields, professors look to colleagues within the discipline for evaluation of graduate programs and of research, and the socialization of the apprentice scholar into the mores of the discipline is one of the principal by-products of doctoral-level education. (Some anthropologists have argued, only half jokingly, that academic departments can best be thought of as tribes, exhibiting all of the behavioral

manifestations of separate cultures.) The presence of deep-seated values and attitudes helps to explain why change in graduate education does not occur simply and directly in response to changing external circumstances.

In this section, we limit our discussions to the findings and recommendations presented in two recent reports, an empirical study prepared for NBGE entitled *Graduate School Adjustments to the "New Depression" in Higher Education*,[33] and the report of the Panel on Alternative Approaches to Graduate Education, entitled *Scholarship for Society*.[34] We also discuss the current status of the Doctor of Arts degree, a new practitioner degree designed primarily to prepare teachers for 2- and 4-year colleges, which has been given considerable financial support in recent years by the Carnegie Corporation of New York.

The graduate school adjustment study combined statistical analyses of various measurable trends in graduate education with site visits to 14 universities for interviews with graduate deans and with faculty members in the fields of English, economics, chemistry, electrical engineering, and psychology. One purpose of the study was to determine whether there had been significant shifts in graduate enrollments or financial resources among departments of differing quality over the period FY 1968 to FY 1973, and a second purpose was to investigate the types of program changes that were occurring in response to changing economic and social circumstances. The dominant finding of the statistical analyses was the stability in the distribution of students and resources among institutions over the period under study:

> The period covered by this study, academic years 1967–1968 through 1972–1973, spanned the final years of growth and prosperity in graduate education and the first few years of the transition to an era of slower growth and diminished resources. The abruptness of change in the environment of graduate education, including the sudden shift from a labor market of excess demand to one of excess supply, and the equally rapid turnaround in federal policy toward support for graduate students and for research, combined with the continued establishment of new doctoral programs, created a great deal of concern about the future health and development of graduate education. Numerous dire predictions were made, stressing the common theme of the destabilizing and potentially disastrous effects that changes in federal and state policies were having upon various aspects of graduate education. The statistical data we have examined in this study, however, point toward a remarkable stability and resiliency in the graduate schools viewed as a system. It is as if a large hand had borne down upon the universities rather evenly, lowering or

[33] David W. Breneman, *Graduate School Adjustments to the "New Depression" in Higher Education*, Technical Report No. 3, National Board on Graduate Education (Washington, D.C.: National Academy of Sciences, 1975).

[34] Panel on Alternative Approaches to Graduate Education, *Scholarship for Society* (Princeton, New Jersey, Educational Testing Service, 1973).

modulating activity levels in several disciplines but not redistributing enrollments or resources among the institutions to any significant extent.[35]

The findings of this study suggest that graduate education is stronger and more resilient than many have thought, at least in terms of those items that can be easily measured quantitatively. The study was not able, however, to assess changes in quality of graduate education that may have occurred in recent years.

On the basis of interviews in 70 academic departments and with 14 graduate deans, the study reached the following conclusion with regard to program change:

> The financial stress and changing labor market conditions experienced by departments in the "Arts and Sciences" disciplines have not stimulated many major program changes. Rather, most departments visited in the course of this study seem to be following a conservative, "enclave" strategy designed to maintain the status quo. During the site visits little evidence was observed of leadership on the part of graduate faculty or administrators in pressing for a re-examination of the goals and purposes of the various graduate programs.[36]

We attribute this finding to several features of graduate education and to the transitional period covered by the study:

1. As currently organized, graduate education is not designed for rapid change in program content or structure. The decision-making process functions by committee and by consensus, not by administrative fiat.

2. In many disciplines, alternative models for graduate education have not been clearly articulated or defined. Standards of quality for the preparation of scholars and researchers are generally understood and accepted within each discipline, programs that break with that tradition are suspect, and this contributes to a conservative stance in many departments. Hence, promotion and salary improvement practices often discourage innovations, even where individual faculty members are willing to undertake change.

3. For many graduate programs, the degree of financial stress in recent years has not been so severe that survival has been at stake. Applications for graduate study have remained strong in most fields, and ways have been found to finance graduate students. Paradoxically, under such circumstances departments will tend to place high priority on the "core" parts of the program, eliminating those activities, such as interdisciplinary studies, that were begun in more affluent times.

[35] David W. Breneman, *Graduate School Adjustments to the "New Depression" in Higher Education*, Technical Report No. 3, National Board on Graduate Education (Washington, D.C.: National Academy of Sciences, 1975), p. 78.
[36] *Ibid.*, pp. 2–3.

4. There was considerable uncertainty and disagreement within most universities regarding the likely duration and severity of the financial squeeze, coupled with an equal disagreement over projected trends in the Ph.D. labor market. Departments that thought the decline was temporary were unlikely to initiate major program changes.

Some of these factors have begun to change, while others will prove more resistant. We believe that graduate education is capable of adapting positively to a new environment, although not so rapidly as some would like. We return to this subject in the next chapter, where it becomes the central issue.

Publication of *Scholarship for Society*, a report of the Panel on Alternative Approaches to Graduate Education, served to stimulate discussion of change in graduate education. The report, sponsored by the Council of Graduate Schools and the Graduate Record Examinations Board, has been widely read and debated on university campuses. Often visionary in content and style, the flavor of the report can be gathered from the following discussion of the future graduate students:

> The composition and activities of the future student body will differ significantly from those typical today, but there will be many continuities. The student population will be fairly evenly divided between the sexes, at least 20 percent of its number will be drawn from minority groups, because of career recycling and new patterns of recurrent education, the ages of students will correspond more closely to those of the general population. Settings for graduate work will be various, and there will be a sense of the campus as one resource center among many. A doctoral candidate in political science might have a job in a store-front civic literacy center in a low income housing project, a doctoral candidate in social psychology might work in a neighborhood educational counseling center; a doctoral candidate in comparative literature might teach in a remedial reading clinic, candidates in biology and chemistry might team up to study and correct deterioration in the local environment.
>
> Traditional methods of evaluating student performance will be supplemented, and in some instances replaced, by continuous processes of critical interaction among teachers, students, and others as members of teams working toward shared goals, and by new modes of communication between learners and teachers flowing from technological advances. It will be standard practice for students and teachers alike to examine the social implications of projected research. Students whose community experience leads them to perceive a need for social change will participate in attempts to secure the necessary change, recognizing the pertinence of such efforts to the education of competent professionals. Wherever possible, course work and independent research will be joined organically with student-faculty problem-solving efforts. Stages in a person's career as graduate student—completion of residencies, scheduling of examinations, termination points of individual research—will be determined in part by the rhythms of progress in the team effort engaging him; catalog-specified requirements will serve as guidelines, but not as law.[37]

[37] Panel on Alternative Approaches to Graduate Education, *Scholarship for Society* (Princeton, New Jersey: Educational Testing Service, 1973), pp. 51–52.

The report contains 26 recommendations covering such topics as clarification of mission among graduate schools, the problem of access, inequities and omissions in the reward system, nonacademic experience as a resource for learning and teaching, and the use of new and neglected media. Many of the recommendations crystallize ideas fairly widely held and often expounded, e.g.:

- Graduate institutions and programs should undertake now to arrive at publicly articulated statements of their goals and functions.
- Graduate institutions should encourage research and innovation in the field of education. There is particular need for research in the teaching/learning process and the proper use of emerging technological aids for instruction.
- Efforts at recruiting able minority people and women to graduate faculties and student bodies should be intensified by every possible means.
- Course sequences, residence regulations, and other institutional requirements should be adapted to meet the needs of students with family responsibilities, adult learners, professionals, those forced to pursue their studies intermittently, and others whose admission to graduate education and preferred patterns of study differ from those regarded as standard.

Other recommendations are, in our view, less persuasive—e.g.:

- In every discipline, and especially at the Ph.D. level, graduate training should include, for *all* candidates who do not already possess such experience, a deliberate and significant component of discipline-related work outside the university walls.
- Experts possessing career achievements in problem-solving should be appointed to graduate faculties, whether or not they can present the usual academic qualifications.
- When a faculty member, in submitting evidence of accomplishment, cites participation in a community venture, salary and tenure reviewers should accept evaluation of the performance by the teacher's colleagues, both academic and non-academic, in the undertaking in question.

The report's significance, however, is not a function of its individual recommendations but of its general tone and approach and its positive outlook regarding new opportunities for graduate education in its service to society. The mood within the graduate community during the last five years has been one of distress, frustration, and uncertainty, and these attitudes can paralyze thought and action if new ideas and new approaches are not forthcoming. The outlook for much of traditional graduate education is not reassuring, and thus the lines of development endorsed by the Panel on Alternative Approaches to Graduate Education deserve serious debate and experimentation. We interpret the report as urging a plurality of approaches to graduate education and a greater diversity among universities in the focus of graduate programs, a point of view that we strongly endorse.

The recent history of the Doctor of Arts (D.A.) degree, a doctoral-level degree for teachers in 2- and 4-year colleges, provides insight into the process of change in graduate education. This degree program has been developed in response to criticisms of the Ph.D. as too specialized

TABLE 7 Status of the Doctor of Arts Degree

Year and Month of Survey	Questionnaires/ Responses	Offering the D.A. Degree	Planning to Offer the D.A. Degree	Considering Offering the D.A. Degree
March 1970	300/267	3	27	46
November 1971	300/272	16	11	60
November 1972	311/293	20	7	33
January 1974	317/300	22	3	23
January 1975	350/322	23	6	20

SOURCE: Robert H. Koenker, *Status of the Doctor of Arts Degree*, unpublished report, January 21, 1975.

for the purpose of undergraduate instruction. Creation of Doctor of Arts programs was endorsed by the Carnegie Commission on Higher Education, and financial support for planning and for student support at a number of institutions has been provided by the Carnegie Corporation of New York.

The evidence thus far, however, suggests that the degree has not yet attracted a wide following. Dr. Robert Koenker, Dean of the Graduate School at Ball State University, Muncie, Indiana, has conducted surveys of over 300 graduate institutions since 1970, requesting information about existing Doctor of Arts programs as well as plans for further development. Table 7 presents results from five yearly surveys.

Dr. Koenker interprets these data as follows:

> The number of institutions offering, planning to offer, or considering the possibility of offering the Doctor of Arts degree has remained about the same in the last three years. In addition, the number of institutions offering doctoral programs which they consider similar to the Doctor of Arts degree has also remained approximately the same in the last three years. In the current study, 36 institutions as compared to 50 in last year's study, reported that there was sufficient flexibility in existing doctoral programs so that a department could offer a D.A. degree type program if it so desired.
>
> It continues to be the author's opinion, derived mainly from comments made by the respondents, that more institutions would initiate Doctor of Arts degree programs, but the following factors have limited its development: the restrictions placed by state commissions of higher education on the introduction of new doctoral programs, the oversupply of doctoral graduates, the financial problems which face a number of institutions of higher education, a lack of understanding of the purpose and functions of the D.A. degree, the relatively large number of institutions which now offer what they consider Doctor of Arts degree type programs under existing doctoral programs, and a number of additional institutions reported that there is sufficient flexibility in existing doctoral programs so that a D.A. degree type program could be offered.[38]

[38] Robert H. Koenker, "Status of the Doctor of Arts Degree," unpublished report, Ball State University, Muncie, Indiana, January 1975, p. 2.

In January 1975, the Carnegie Corporation of New York announced awards totaling $492,000 to 15 colleges and universities to strengthen recently developed Doctor of Arts programs. In making the awards, the Corporation noted that ". . . the D.A. is at a critical stage in its development," a theme echoed in the Proceedings of the Second Wingspread Conference on the Doctor of Arts Degree, October 8–9, 1973.[39] We draw three lessons from the recent experience of graduate education with this degree:

1. Changes as significant as the creation of a new degree program will not occur rapidly, particularly when there is disagreement among faculty members regarding the nature, purposes, and structure of the program.
2. Tighter budgets constrain, rather than encourage, program innovation. Without the substantial support provided by the Carnegie Corporation, there is little doubt that Doctor of Arts programs would have been fewer in number and less well-developed at this time. Growth by substitution, i.e., the termination of one activity to provide resources for another, does occur in higher education, but that process is inevitably slower than growth by addition.
3. The universities that are showing greatest interest in developing D.A. programs are, for the most part, developing universities that do not have a long history of offering the Ph.D. We see this fact as evidence that division of effort and the identification of differentiated program missions among institutions are occurring at the graduate level, developments that should be encouraged.

In this chapter, we have reviewed, in a brief and necessarily selective fashion, several of the major developments bearing on graduate education during the period of the Board's tenure. When we look back at the prophecies of doom regarding the future of graduate education that were expressed by some observers in the early 1970's, we are impressed by the degree of strength and vitality that the graduate enterprise has shown in moving through the recent years of declining resources, increasing uncertainty, and changing government policy. Many challenges lie ahead, and great resourcefulness, hard work, good will, and dedication will be required to surmount them: on the basis of our observations and experience during the last several years, however, we can reaffirm our earlier assessment:

> In looking to the future to see how graduate education and research can perform more effectively, the fact that we build on a strong base should not be ignored. Graduate educa-

[39] Arthur N. Collins (ed.), *Analytical Models of Doctor of Arts Programs*. Proceedings of the Second Wingspread Conference on the Doctor of Arts Degree, October 8–9, 1973 (Washington, D.C., The Council of Graduate Schools in the United States, 1974).

tion has been flexible and responsive in many ways. It was the instrument through which the teachers were trained for the great expansion of secondary and higher education over the past two decades. Graduate education produced the scientists and engineers for the nation's excellent biomedical research programs. The nation's universities have been the site of the broadest and deepest penetration of new frontiers of knowledge since the scientific revolution.

Accordingly, we do not view graduate education as being in a state of ineffectiveness or weakness. On the contrary, it is strong in terms of the capacity of its faculties and the abilities of its students, broad in terms of fields of learning, significantly responsive to social needs, intellectually rich in terms of library and research resources, widely dispersed throughout the nation, and diverse in approach and content. These are assets which make it possible to approach the problems of readjustment to the future with confidence.

These accomplishments are recorded not as a basis for self satisfaction, nor as a plea for retention of the *status quo*. They are stated to emphasize that the tasks of readjustment, which are real, complicated, difficult, and necessarily slow moving, can be approached with confidence.[10]

[10] National Board on Graduate Education, *Federal Policy Alternatives toward Graduate Education* (Washington, D.C., National Academy of Sciences, 1974), pp. 26-27.

2 The Outlook

Forecasts of future developments that will affect graduate education, in common with other efforts at social and economic forecasting, must be viewed with a degree of skepticism for at least two reasons. First, any survey of past forecasting attempts, whether in the area of manpower projections or economic projections, reveals that events have generally overtaken the forecasts within a relatively short time, thereby reducing the accuracy of the forecasts. Second, although some methodological improvements have been made, e.g., the development of economic input–output models and advances in econometric technique, social science has not yet developed forecasting techniques that are either intellectually compelling or generally accepted. This situation poses particularly difficult problems for activities such as graduate education where program development spans many years, major decisions on program direction made in 1975, for example, may not be fully implemented until the 1980's, at which time circumstances may have altered significantly from those forecast earlier. To a considerable degree, this has been the dilemma of graduate education in recent years, as the heady forecasts of virtually limitless growth, prevalent in the 1960's, went awry in the early 1970's, stranding many universities with graduate programs in various stages of development. Hence, the jaundiced view of many educators toward forecasts is understandable.

The problems caused by unreliable forecasts cannot be solved by ignoring them, however, because decisions must be made, and information about the future, however uncertain, must be a part of those decisions. Consequently, in this chapter we examine several forecasts (or projec-

tions) that have significance for graduate education, extracting from them conclusions that we believe are likely to be most accurate. In the following chapter, we develop the implications of this exercise and present several recommendations based on our view of the outlook.

LABOR MARKET PROJECTIONS FOR NEW PH.D.'S

Projections of the labor market for new doctorates are among the dominant factors that influence decision-making about graduate education. Student decisions, faculty decisions, institutional decisions, and governmental decisions are often implicitly, if not explicitly, based on beliefs or assumptions about future market conditions. In this section, we examine recent projections of academic and nonacademic demand for new doctorates, relate these to projections of supply, and discuss the type of adjustment problems we foresee for the various disciplines.

Projections of Academic Demand

The size of the traditional college-age group can be projected with considerable accuracy into the 1990's, and it is the projected decline of the size of that group, beginning in the early 1980's, that has been the basis of forecasts of declining demand for college faculty (see Table 8). Other factors, such as changes in high school graduation rates, college attendance rates, and student–faculty ratios, however, produce some slippage in a simple demographic model of faculty demand. Enrollment projections also vary, depending upon different assumptions about part-time attendance, enrollment by nontraditional age groups, types and amount of financial support available, trends in recurrent education, and so forth. Figure 2, reproduced from the Carnegie Foundation for the Advancement of Teaching report, *More Than Survival*, shows the extreme variation that exists among enrollment projections.

In our judgment, the most reliable projections of the academic labor market are those of Allan M. Cartter, and our discussion in this section is based largely on his work. Cartter's forecasts have been published widely, and we shall not repeat them in detail; for our purposes, his most significant conclusion is that as few as 3,000 to 5,000 new Ph.D.'s, on average, may find faculty employment annually during the 1980's.[41] These figures can be compared to current and projected rates of Ph.D. production in excess of 30,000 annually. At the pessimistic extreme,

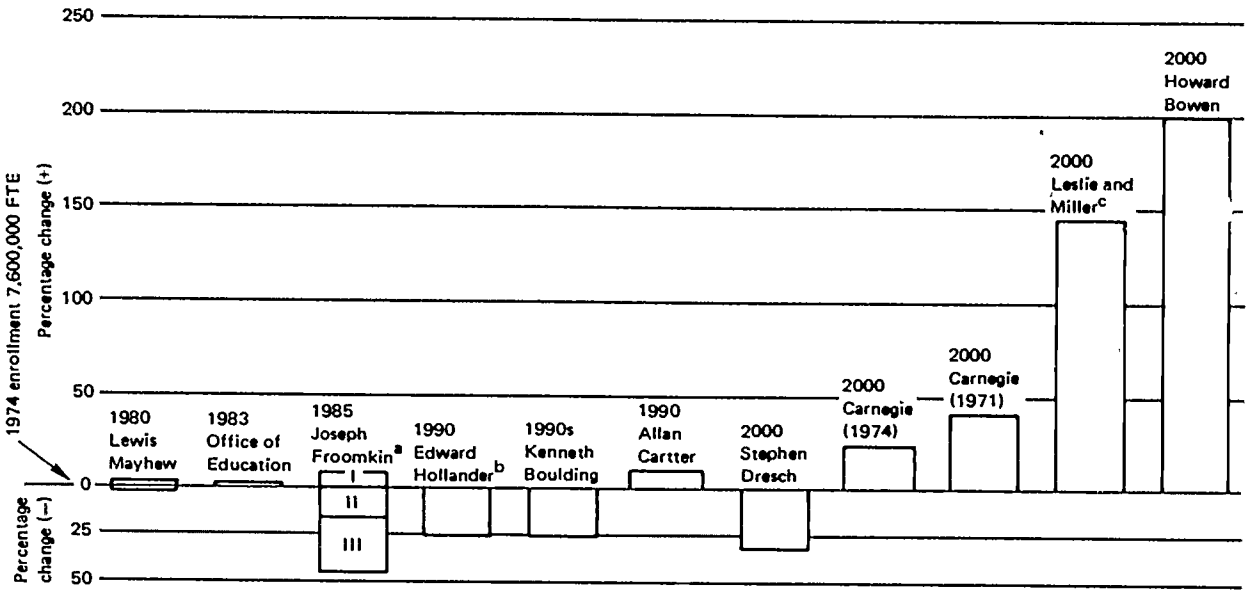
[41] Allan M. Cartter, "An Overview of the Academic Labor Market," prepared for a Conference on Graduate Education, Manpower and Costs, Urbana, Illinois, July 11, 1974.

TABLE 8 Changes in the Age Composition of the United States Population, 1960–1990 (Projected), Selected Age Groups

	Percent Change in the Number in Each Age Group, by Decade			Percent of Population			
Age Group	1960–1970	1970–1980[a]	1980–1990[a]	1960	1970	1980[a]	1990[a]
18–24	53	19	−15	8.9	12.0	13.2	10.5
25–44	3	29	26	26.1	23.6	28.1	32.9

[a]Population projections based on Series F, U.S. Bureau of the Census.

SOURCE: U.S. Bureau of the Census, *Population of the United States, Trends and Prospects: 1950–1990*, Current Population Reports, Series P-23, No. 49 (Washington, D.C.: U.S. Government Printing Office, 1974), and related U.S. Census documents.



[a]Froomkin sets forth three "scenarios."
[b]Enrollment level for full-time undergraduates in the state of New York.
[c]Leslie and Miller assume that enrollment in higher education is linked directly to the rate of growth of the total gross national product. The Council has estimated the implied growth on the assumption that real GNP rises at an annual average rate of 3.5 percent a year from 1974 to 2000.

FIGURE 2 How different projections and possibilities for enrollment in higher education compare with the 1974 level of enrollment (percentage comparisons). SOURCE: **Carnegie Foundation for the Advancement of Teaching, *More Than Survival* (San Francisco: Jossey-Bass, Inc. 1975). Reprinted with permission of Jossey-Bass, Inc., and the Carnegie Foundation for the Advancement of Teaching.**

therefore, as few as 1 in 10 new doctorates may secure faculty employment during the next decade.

In a recent study, Cartter has examined two factors—market response and institutional policy decisions—that could increase the number of academic positions available for new Ph.D.'s in the 1980's to levels as high as 10,000 to 15,000 annually,[42] although we believe the higher figure (15,000) to be unlikely. The factors he considers are an increased out-migration of senior faculty from academe, a downward adjustment in mandatory retirement age, and a decline in the promotion-to-tenure rate of nontenured faculty. The increase in senior faculty out-migration might occur if faculty salaries decline relative to professional salaries in nonacademic positions; Cartter notes that a 1 percent annual net outflow of senior faculty (approximately 4,000) would be sufficient to employ an additional 10 percent of new doctorates at projected output levels. Of course, out-migration of senior faculty will not occur uniformly across disciplines, i.e., we would expect this process to provide more positions for scientists, engineers, and economists than for professors in the humanities. The other adjustments that Cartter considers are university responses to reduce the proportion of tenured professors. Cartter points out, however, that a shift to early retirements would provide a "one-time-only" benefit in terms of large numbers of new positions created, while the decline in the promotion-to-tenure rate would help new doctorates at the expense of their untenured peers 5–6 years out of graduate school.

Projections of Nonacademic Demand

As we observed in an earlier report,[43] relatively little is known about the determinants of nonacademic demand for doctorates; indeed, the subject is not even clear conceptually, since some forms of nonacademic demand are viewed as "underemployment," in the sense that doctoral-level education is not required or utilized in the position. Others view the movement of Ph.D.'s into such positions as "enrichment," and point to the steady upgrading of educational skills in the labor force during this century. A further complication arises in fields that have heretofore placed the vast majority of Ph.D.'s in academic positions; the nature and determinants of nonacademic demand for philosophers and historians, for

[42] Allan M. Cartter and John McDowell, "Changing Employment Patterns and Faculty Demographics," in Allan M. Cartter (ed.), *Assuring Academic Progress Without Growth* (San Francisco: Jossey-Bass, Inc., 1975).

[43] National Board on Graduate Education, *Doctorate Manpower Forecasts and Policy* (Washington, D.C.: National Academy of Sciences, 1973), p. 13.

TABLE 9 Comparisons of 1980 Projections of R&D Expenditures (in billions of dollars) from Several NSF Studies

Projected Expenditures for R&D	1975 Report	1971 Report	1969 Report	Percent Difference between 1975 and 1971 Report	Percent Difference between 1975 and 1969 Report
Low	$31.1[a]	$48.5	$36.2	47.3%	16.4%
High		50.9	42.4	63.7	36.3

SOURCE. National Science Foundation. *Projections of Science and Engineering Doctorate Supply and Utilization, 1980 and 1985* (Washington, D.C.: U.S. Government Printing Office, 1975), p. 28.
[a]The 1975 report did not include a low and a high projection.

example, are far from clear analytically, although we know that few Ph.D.'s in those or any other fields will be literally unemployed.

One important factor that has in the past determined the bulk of discipline-related nonacademic employment for doctoral-level scientists and engineers is the level of national R&D expenditures. In their most recent projection of doctorate supply and utilization, the National Science Foundation projects R&D expenditures to grow at an average annual rate of 1.4 percent (in constant dollars) between 1972 and 1985, increasing from $29.1 billion to $34.7 billion (in 1972 prices) over this period.[44] This is an extremely low rate of increase relative to the rates that prevailed during the late 1950's and 1960's and, when coupled with the projected small increase in academic demand, results in the NSF projection of growing imbalance between the doctoral-level science and engineering labor force and discipline-related employment demand.

Estimates of future R&D expenditure are subject to much greater error than are estimates of future academic demand for faculty, since there is nothing so solid in the R&D domain as the demographic data that are the basis of faculty demand projections. Since federal R&D expenditures are a large part of the total, the level is highly responsive to shifting federal priorities, e.g., the decision to land a man on the moon or to develop nuclear power. Table 9, taken from the NSF report, shows how volatile that agency's past projections of R&D expenditures in 1980 have been, in reports published in 1969, 1971, and 1975. The 1975 projection, for example, represents more than a 50 percent reduction in estimated R&D expenditures in 1980 from the level projected for that year in the 1971 report.

[44] The National Science Foundation, *Projections of Science and Engineering Doctorate Supply and Utilization, 1980 and 1985.* National Science Foundation 75-301 (Washington, D.C., United States Government Printing Office, 1975), p. 21.

As another index of the uncertainty that surrounds projections of R&D expenditures, a comparison of actual and projected levels in relation to GNP is instructive. In the early 1960's, the Bureau of Labor Statistics, in a study prepared for NSF, projected that R&D expenditures would increase by 123 percent from 1960 to 1970, reaching 3.7 percent of GNP by 1970. In fact, R&D expenditures reached only 2.7 percent of GNP in 1970, causing the earlier estimate of scientist and engineering employment to be off by 237,000 positions.[45] By comparison, in the latest NSF projection, R&D is estimated to grow at one-third the rate of GNP (1.4 percent versus 4.1 percent), resulting in a projected decline in the proportion of GNP devoted to R&D from 2.5 percent in 1972 to 1.8 percent in 1985.[46] If this projection proves accurate, nonacademic R&D expenditure will not be the steadily expanding source of demand for new Ph.D.'s that some have assumed (or hoped) it would be. Table 10 contains NSF's estimate of the number of new doctorates expected to gain nonacademic R&D employment over the period 1972–1985, by broad disciplinary group.

We are not in a position to evaluate the accuracy of this latest NSF projection in detail, other than to point out that past projections have been wide of the mark, suggesting that allowance for such error should be made in this case. We have no reason to dispute the accuracy of the projected trend in R&D expenditure, however, and we assume that R&D will continue to decline as a percentage of GNP in the absence of major new federal initiatives, not currently foreseen.

Our conclusion regarding the employment prospects for new Ph.D.'s in the next 10 years can be summarized briefly. The two principal sources of employment for Ph.D.'s that have traditionally made direct use of the advanced education and research skills provided by doctoral education—college and university teaching and nonacademic R&D employment—will fall far short of the likely number of new Ph.D.'s entering the labor market. Allan Cartter's analysis suggests that, by the early 1980's, as few as 3,000–5,000 new Ph.D.'s may find academic employment per year on average and the NSF projections for the period 1972–1985 indicate that, on average, approximately 4,000 new doctorates per year in the sciences (covering the physical sciences, engineering, mathematics, life sciences, and social sciences) will secure nonacademic R&D employment. Conse-

[45] Harold Goldstein, "Experience in Projection of the Demand for Scientists and Engineers," unpublished paper prepared for the Seminar on Scientific and Technical Manpower Projections sponsored by the National Science Foundation, Hot Springs, Virginia, April 17, 1974.

[46] The National Science Foundation, *Projections of Science and Engineering Doctorate Supply and Utilization, 1980 and 1985*, National Science Foundation 75-301 (Washington, D.C., United States Government Printing Office, 1975), computed from data on p. 8 and p. 21.

TABLE 10 Components of Projected Demand for New Doctorates in Nonacademic R&D, 1972–1985

Field	Nonacademic R&D (thousands)
Total, all fields	*49.1*
Growth	31.7
Replacement	17.4
Physical sciences	*22.3*
Growth	13.9
Replacement	8.4
Engineering	*11.6*
Growth	8.1
Replacement	3.5
Mathematics	*1.2*
Growth	0.8
Replacement	0.4
Life sciences	*10.1*
Growth	6.3
Replacement	3.8
Social sciences	*3.9*
Growth	2.6
Replacement	1.3

SOURCE: National Science Foundation, *Projections of Science and Engineering Doctorate Supply and Utilization, 1980 and 1985* (Washington, D.C.: U.S. Government Printing Office, 1975), p. 36.

quently, if these projections are broadly accurate, within 5 years as few as 7,000–9,000, and probably no more than 15,000–20,000, new Ph.D.'s per year may secure employment that is closely related to the education provided in graduate school. (Note that the students who will receive doctorates in the early 1980's are those entering graduate programs now.) In FY 1974, 33,000 doctorate degrees were awarded, and most projections foresee slow but continuing growth in this number, reaching perhaps 40,000 in the early 1980's. Even if we allow for a substantial margin of error in each computation, these figures point to a massive (and not temporary) shift in the labor market for Ph.D.'s during the next decade.

In our opinion, it would be a serious mistake if students, faculty, department heads, university administrators, state and federal agencies, and private foundations ignored or dismissed these projections. Responsible action and planning must be started now if the potential human costs suggested by these projections are to be reduced. In particular, if

universities drift through the next 4–5 years in the hope that something unforeseen will brighten the picture, we foresee a wrenching and extremely damaging downward adjustment in the 1980's that could be minimized by careful planning and action now.

Projected Trends in Ph.D. Supply

One of the possible adjustments to the projected supply–demand imbalance is a decline in doctoral enrollments, as potential graduate students react to current (or projected) labor market conditions. In a technical report to NBGE,[17] Freeman and Breneman stressed the importance of supply-side adjustments and presented evidence from several disciplines that graduate enrollments have fallen in response to labor market decline. As noted in the previous chapter, this simple economic approach predicts student behavior more accurately in some disciplines than in others. In the physical sciences and in engineering, student response to the deteriorating labor market has been rapid and pronounced; graduate enrollments began dropping in the late 1960's, and in several fields, such as physics and chemistry, Ph.D. production is down absolutely. Student response in other disciplines, however, including the humanities, education, and several social science fields, does not appear to have been as pronounced, although some downward adjustment will undoubtedly occur.

Whether informed student response will be sufficient to bring labor markets into closer balance in the 1980's is not clear, although this seems more likely to occur in fields such as physics and chemistry than in English or history. In disciplines that have traditionally placed a large proportion of Ph.D.'s in nonacademic jobs, a cyclical pattern could develop if R&D expenditures were to increase substantially (counter to NSF projections) in the early 1980's; a shortage of new science Ph.D.'s is even conceivable, and should that occur, we would expect to see an increase in science graduate enrollments at that time. A pattern of oscillation between shortage and surplus over 5–6-year intervals has been documented in the past, and this could continue in certain science and engineering disciplines. This cyclical process of labor market adjustment creates problems for graduate programs, since there is a continual, if predictable, disequilibrium, however, the process tends to be self-correcting, and the affected disciplines increasingly understand the pattern and can adjust accordingly.

[17] Richard B. Freeman and David W. Breneman. *Forecasting the Ph.D. Labor Market. Pitfalls for Policy.* Technical Report No. 2. National Board on Graduate Education (Washington, D.C.: National Academy of Sciences, 1974).

A different and more troublesome pattern occurs in fields that lack a substantial nonacademic demand for their doctorates. The humanities and many social science disciplines have traditionally placed 85–90 percent of their Ph.D.'s in college and university teaching. In such cases, if a drop in demand for new Ph.D.'s leads to a reduction in graduate enrollments, that depresses the market more by further reducing the demand for faculty. In these fields, a supply reduction generates further demand reduction, a process that could lead to a substantial contraction of the disciplines in question during the next decade. Maintaining strong graduate programs in fields that have traditionally placed most doctorates in college and university teaching will be one of the most difficult and challenging tasks facing the university during the 1980's.

PROSPECTS FOR GRADUATE STUDENT FINANCIAL SUPPORT

If the labor market projections discussed above prove broadly accurate, then it is only realistic to assume that prospects for graduate student financial support will not improve. Shortages of highly educated manpower prompted the high levels of federal fellowship and traineeship support in the past, and the end of those shortages led to the termination of many federal support programs. While the principle of ensuring equal educational opportunity has resulted in need-based student-aid programs at the undergraduate level in order to overcome financial barriers to college attendance, there is no indication at present that this quasi-entitlement concept will be extended to the graduate level. The time may come when the steady advance of knowledge and the increasing complexity of our society will make some form of graduate education a virtual necessity for large numbers of the populace, and when that day arrives (but not before), we would expect federal legislation creating a Graduate Opportunity Grant program similar to the undergraduate Basic Educational Opportunity Grants.

We noted in the previous chapter the rapid increase in recent years in the number of graduate and professional students supported under the GI Bill. As the number of eligible veterans declines over the next few years, this source of support will diminish as rapidly as it grew. The data provided by the Veterans' Administration do not permit detailed analysis of the distribution of supported students among disciplines, institutions, or degree level (i.e., master's versus Ph.D. versus professional), and therefore it is impossible to predict with any accuracy the impact of diminished support from this source. It seems clear, however, that the loss of funds that have supported over 200,000 graduate and pro-

fessional students in FY 1975 will have a sharply contractive effect on the number of students enrolled.

Two other major sources of graduate student support, teaching and research assistantships, require part-time work in return for a stipend and, in some cases, tuition waiver. The number of graduate students supported by these assistantships will depend primarily on the level of undergraduate enrollments and on the level of sponsored research within the universities, assuming that no major change in the organization of undergraduate instruction or research activity occurs. If undergraduate enrollments decline absolutely during the 1980's, so may the number of teaching assistantships; the spread of faculty and teaching assistant unionization may also affect the numbers of such positions. Should full-time graduate enrollments contract substantially, faculty workload would shift toward increased undergraduate instruction, both reducing the demand for teaching assistants and increasing the unit costs of undergraduate education. It is difficult to predict the outcome of these multiple forces, but the general tendency seems to be toward either stable or slightly declining numbers of teaching assistantships in the next decade.

A complicating factor in projecting the likely number of research assistantships is the possibility that principal investigators will increasingly shift from graduate students to postdoctoral research associates on project grants. When new Ph.D.'s are available for such positions, there is strong economic incentive favoring their employment in place of graduate students, who are not as well trained (and hence are less productive) and who can only work part-time. Extrapolated to an extreme, one can envisage senior professors and postdoctoral research associates carrying out research in institutes that are increasingly separated from the educational programs of the university, both graduate and undergraduate. Should this occur, the distinguishing feature of graduate education in the United States, its complementarity and close linkage with undergraduate education and research, would be lost, and the vitality of the university as an institution would suffer. If such a change does not occur, however, research assistantships should roughly follow the level of sponsored research activity.

Graduate student support has also been provided from the university's own funds and from private foundations, but both of these sources can be expected to decline. We see no obvious end to the financial pressure facing universities, and, as long as such pressures continue, there is little likelihood that reduced support from other sources can be offset by reallocation of university funds. Among private foundations, the Ford Foundation has provided the largest amount of graduate student support in recent years, first, by its contribution of over $52 million to the Woodrow Wilson National Fellowship Program from 1957 to 1967, and,

more recently, with grants of over $41 million to several institutions to support doctoral students in the humanities and social sciences. With the end of this last program in 1975, the Foundation has completed its major program of graduate student support, and the recent announcement of cutbacks in expenditure within the Division of Education and Research makes it clear that no new programs of this magnitude can be expected in the foreseeable future.

The final source of support is self-finance, through a combination of part-time employment, savings, family support, spouse's earnings, and loans. The proportion of graduate students who are primarily self-financing has increased steadily in recent years,[48] and this trend can be expected to continue. As a matter of public policy, we believe that some increase in self-support is reasonable; the benefits of advanced education are both private and social, but the social benefits produced by supporting large numbers of graduate students with public money have declined as labor market shortages have ended. Under this circumstance, some reduction in the proportion of cost borne by the public should be expected. The great practical difficulty lies in ensuring equity among students as an increased proportion of the costs are transferred to them. The impact of raising the private cost of graduate education, however, will surely be to reduce the number who enroll full-time.

All of these factors point toward a contraction in full-time doctoral enrollments over the next several years and a likely increase in part-time enrollment, as students combine graduate study with off-campus employment. Master's-level work with an applied, career-oriented focus is also likely to increase, particularly in large urban centers. The reduction of subsidy and the increased need to borrow will force more graduate students to view their education explicitly in investment terms, and this will produce pressures to rationalize graduate education in terms of course content, degree requirements, timing of course offerings, and so on. In the long run, the increased private costs borne by graduate students may do more to alter the nature of graduate education than any other force.

NEW CLIENTELES FOR GRADUATE EDUCATION

In our discussion thus far, we have stressed the changing labor market facing graduates with advanced degrees and the associated reduction in public subsidy for graduate students. A third broad social force that we believe will impinge increasingly on graduate education is an ever greater

[48] National Board on Graduate Education, *Federal Policy Alternatives toward Graduate Education* (Washington, D.C., National Academy of Sciences, 1974), p. 47.

diversity in the people seeking some form of postbaccalaureate education. Older students, fully employed students, part-time students, nonresidential students—these are the groups that hold the promise for growth and expansion in graduate education during the next decade. (As Table 8, p. 30, shows, the decline in the 18–24 age group in the 1980's will be accompanied by a large increase in the 25–44 age group.) A reorientation of parts of our "system" of graduate education to meet the needs of these new and expanding clienteles is essential.

A recent internal evaluation of the status of women in graduate education at the University of Michigan[19] evolved into a broader study of problems facing "nontraditional" graduate students, since women have tended to fall disproportionately into that category. The report included several examples of the nontraditional graduate student:

- The mature person who wishes to change careers or to begin training after raising a family, but who may need academic refreshing before qualifying for regular admission to a graduate department;
- The parent responsible for home and small children who cannot attend an educational program full-time;
- The professional (such as the employed engineer, public administrator, or pharmacist) who wishes to upgrade her or his knowledge and skills without earning another degree;
- The single parent who wishes to prepare for a professional career through advanced training but who must continue to earn through part-time employment.

Several barriers to participation in graduate study for such individuals were noted:

- Financial aid eligibility regulations do not mention part-time students and explicitly exclude students who have been granted special admissions status to refresh their academic skills;
- Course scheduling and articulation are often planned for traditional students and cannot be adjusted to suit the schedules of non-traditional students;
- Few departments provide academic advising specifically geared to the needs of the non-traditional student;
- University-supported child care facilities do not exist;
- Continuing graduate enrollment status is not available to students who wish to take graduate level courses, but do not desire admission to specific departments or degree programs.

The report concluded with several recommended policy changes designed to eliminate or reduce these barriers to participation.

NBGE investigated in detail one potential new clientele group—community college faculty members—by sponsoring a conference on co-

[19] Committee to Study the Status of Women in Graduate Education and Later Careers, *The Higher, The Fewer* (Ann Arbor, Michigan: The Horace H. Rackham School of Graduate Studies, March 1974).

operative approaches to community college staff development.[50] The conference focused on the need for graduate programs, both preservice and in-service, that meet certain needs of faculty members in the 2-year institutions.

At the preservice level, many community colleges have resisted employing Ph.D.'s, even though individuals with doctorates have recently been available. Although several factors are involved, it is clear that current Ph.D. programs do not prepare people in an optimal fashion for teaching positions in most community colleges. Furthermore, many current community college faculty members want to return to the university for additional graduate work, but they seek programs that will help them be more effective in teaching the diverse and rapidly changing student body in the community colleges. An ideal type of in-service graduate program might combine further disciplinary courses with seminars on more effective ways to present materials, a one-year residency at the university with additional work in evening or summer courses, and a dissertation focused on the teaching of the subject.

A well-designed doctor of arts program would meet many of these needs, but such programs are not yet widely available. Many people in the community colleges have concluded that universities are not interested in developing programs to meet these needs, and there has been active discussion within the American Association of Community–Junior Colleges (AACJC) of establishing for community college staff development regional centers not associated with any university. The participants at the NBGE conference agreed that the resources for mounting successful in-service programs were present in existing institutions and that separate regional centers would not be necessary if cooperative programs between the university and community college can be developed. *We recommend that a significant number of universities take the initiative in exploring the potential for such programs in their regions, cooperating closely with the community–junior colleges in the service area.*

No one can be certain how extensive the demand for various forms of postbaccalaureate education will be on the part of those groups that have heretofore not participated heavily in graduate education. Some studies have suggested a high degree of interest,[51] but that is not the same as

[50] S. V. Martorana, William Toombs, and David W. Breneman (eds.), *Graduate Education and Community Colleges. Cooperative Approaches to Community College Staff Development*, Technical Report No. 5, National Board on Graduate Education (Washington, D.C.: National Academy of Sciences, 1975).

[51] For example, David P. Gardner and Joseph Zelan, "A Strategy for Change in Higher Education: The Extended University of the University of California," paper prepared for the Conference on Future Structures of Post Secondary Education, OECD, Paris, June 26–29, 1973, and Stewart Edelstein, Hannah Kreplin, Leland Medsker, Janet Ruyle, and John

final enrollment demand. Nor do we think that all universities should attempt to develop programs targeted at these potential new clientele groups. We do think, however, that a substantial amount of experimentation should be encouraged so that more can be learned about the types of programs that are wanted and the conditions required for success. Undoubtedly, many of the ideas currently being discussed under the rubric of "nontraditional" graduate education will be tested and found wanting; however, successful programs are certain to develop as universities channel their efforts in this direction, and these can serve as models for others.

EXPANDED ACCESS TO GRADUATE EDUCATION FOR WOMEN AND MINORITY-GROUP MEMBERS

We foresee a continued expansion in the number of women and minority-group members seeking professional careers that require some form of graduate education. Although it has been common to compare the situation for women and for minorities in reports concerned with education, access to jobs, and career development, it was not helpful to consider both groups in a single report on participation in graduate education. The issues and problems are sufficiently different to require separate treatment.

Recent figures reveal that minority persons have largely not been included in opportunities for advanced study. While minority men and women comprise more than 15 percent of the total U.S. population, they represent less than 6 percent of all students enrolled in master's and doctoral programs in graduate schools.[52] Blacks, Chicanos, Puerto Ricans, and American Indians born in this country earned less than 5 percent of total doctorates awarded in 1973–1974.[53] Moreover, minority persons are unevenly distributed in disciplinary fields of study; for example, blacks received less than 2 percent of all doctorates conferred in the natural science fields but earned more than 8 percent of doctorates awarded in education in 1973–1974.[54]

Shea. *Extended Opportunities for a College Degree. Practice, Problems, and Potentials* (Berkeley, Calif., Center for Research and Development in Higher Education, November 1974), p. 327.

[52] Elaine H. El-Khawas and Joan L. Kinzer, *Enrollment of Minority Graduate Students at Ph.D. Granting Institutions*, Higher Education Panel Reports, No. 19 (Washington, D.C.: American Council on Education, 1974), p. 11.

[53] Analysis of data from Doctorate Records File, National Research Council, National Academy of Sciences, Washington, D.C.

[54] *Ibid.*

The reasons underlying this situation are many and complex. Individual circumstances, such as financial constraints, family obligations, poor undergraduate preparation, inadequate counseling, and low self-confidence, may affect all students (minority and nonminority) and thus prevent graduate school attendance. For minority persons, however, such handicaps are likely to be of greater magnitude, more common, and mutually reinforcing. Moreover, barriers to minority participation are in large part a legacy of historical inequities.

In recent years the number of minority students receiving bachelor's degrees has increased sharply. With the availability of a pool of qualified candidates for advanced study, efforts to increase participation at the graduate level are now feasible. Current efforts are fragmented and inadequate, however, and are constrained by such factors as legal uncertainties, lack of national leadership, and financial pressures. NBGE has recently prepared a detailed report, *Minority Group Participation in Graduate Education*, that analyzes the present status of minorities in graduate education, including discussion of barriers to participation, affirmative action and legal issues, and current activities to increase minority-group participation in graduate education.[55] Recommendations for action by colleges and universities, state and federal governments, professional societies, philanthropic foundations, and industry are contained in that report.

Women's participation in higher education and in the academic labor market has been the subject of numerous recent studies and research reports.[56] At the graduate level, the major concerns have been the following:

1. As the title of one recent study, *The Higher, The Fewer*, suggests, women's participation in education declines steadily as one moves up the academic degree ladder.
2. Although most studies have found little, if any, evidence that

[55] National Board on Graduate Education, *Minority Group Participation in Graduate Education* (Washington, D.C., National Academy of Sciences, forthcoming).

[56] Major studies include Helen S. Astin, *The Woman Doctorate in America* (New York, Russell Sage Foundation, 1969), Carnegie Commission on Higher Education, *Opportunities for Women in Higher Education* (New York, McGraw-Hill Book Co., 1973), Saul D. Feldman, *Escape from the Doll's House* (New York, McGraw-Hill Book Co., 1974), W. Todd Furniss and Patricia Albjerg Graham (eds.), *Women in Higher Education* (Washington, D.C., American Council on Education, 1974), Alice S. Rossi and Ann Calderwood (eds.), *Academic Women on the Move* (New York, Russell Sage Foundation, 1973), and Committee to Study the Status of Women in Graduate Education and Later Careers, *The Higher, The Fewer* (Ann Arbor, Michigan: The Horace H. Rackham School of Graduate Studies, March 1974).

TABLE 11 Total Ph.D.'s Awarded and Ph.D.'s Awarded to Women, FY 1967–FY 1974

Fiscal Year	Total Ph.D.'s Awarded	Ph.D.'s Awarded to Women	
		No.	Percent
1967	20,384	2,440	12.0
1968	22,916	2,931	12.8
1969	25,728	3,387	13.2
1970	29,479	3,970	13.5
1971	31,841	4,594	14.4
1972	33,001	5,282	16.0
1973	33,727	6,071	18.0
1974	33,000	6,415	19.4

SOURCE: National Research Council, Doctorate Records File.

women are discriminated against in graduate admissions, women have experienced much higher attrition rates than men enroute to the Ph.D.

3. The distribution of female graduate students is highly skewed toward the humanities and education, with very few women enrolled in the physical sciences, engineering, or in certain social sciences, such as economics.

4. Women doctorates, as a group, have not done so well as men in academic placements, career progression, or in salary.

Over the period 1920–1972, more than 400,000 doctorates were awarded by U.S. universities, and women received approximately 50,000 (12.5 percent) of these degrees. Furthermore, over this period there was relatively little deviation in the annual proportion of doctorates awarded to women. Very recently, however, there has been a noticeable increase in the proportion of doctorates awarded to women, as Table 11 shows.

The distribution of women doctorates among major disciplinary areas for 1961, 1967, and 1973 is presented in Table 12. These patterns reflect society's stereotypes about "proper" disciplines and careers for women, but these stereotypes are rapidly breaking down. As more and more young women are encouraged by parents, by peers, and by grade school, high school, and college teachers to consider careers in science, engineering, business, and law, their numbers in graduate and professional schools in these areas will increase.

With respect to the labor market, Cartter and Ruhter have reported evidence of improvement in the quality of first job placement for women

TABLE 12 Distribution of Women Doctorates by Field, 1961, 1967, 1973

Discipline (by year)	Women Doctorates No.	Percent	Total
Physical sciences			
1961	102	4.4	2,325
1967	211	4.9	4,306
1973	376	7.2	5,238
Engineering			
1961	6	0.6	940
1967	8	0.3	2,581
1973	43	1.3	3,338
Biosciences			
1961	187	10.5	1,782
1967	412	13.2	3,116
1973	872	17.2	5,068
Social sciences			
1961	265	14.6	1,821
1967	442	14.8	2,978
1973	1,241	21.0	5,911
Arts and humanities			
1961	267	17.9	1,495
1967	550	19.4	2,839
1973	1,545	28.8	5,364
Education			
1961	373	22.0	1,680
1967	678	19.7	3,442
1973	1,783	24.6	7,248
Professional			
1961	50	13.6	368
1967	30	4.9	618
1973	200	13.7	1,461
Total			
1961	1,251	12.1	10,411
1967	2,331	11.7	19,880
1973	6,060	18.0	33,628

SOURCE: National Research Council, Doctorate Records File.

Ph.D.'s over the period 1967–1973,[57] but the proportion of new women doctorates reporting no specific employment prospects at receipt of the degree still remains markedly higher than for men.[58] A recent and detailed self-study at the University of Michigan concluded that, among its own graduates, "Women are distinctly disadvantaged in placement at the doctoral level, despite recent publicity about quotas and HEW pressure. Life cycle constraints such as the lack of mobility, child rearing responsibilities, and a higher incidence of 2-Ph.D. families among women than among men, appear to affect placement, although single women also experience difficulty."[59] *We do not believe there is any conclusive evidence that labor market discrimination against academic women has been eliminated, although progress has been made. Thus, we endorse continued positive action to eliminate those aspects of discrimination that persist.*

The situation for women in graduate education is part of the much broader issue of the changing role of women in American society. As the aspirations of women change and as they seek access to graduate and professional education in new areas, we do not believe they will encounter particular or unique obstacles in the graduate programs. As with any social change of this magnitude and rapidity, there will be some graduate faculty whose attitudes will not have kept pace with changes in the broader society, but this situation will not prevent women from succeeding in graduate and professional schools. (We cannot assert that graduate faculty are, as a group, more virtuous than the majority of the populace, but we are confident that they are not less so.) And, as the number and proportion of senior women faculty members and administrators steadily increase, the problems facing women in graduate school caused by their small numbers in specific fields should steadily diminish.

PROGRAM EVALUATION AND ACCOUNTABILITY

As noted briefly in the last chapter, there has been a steady increase in the questions asked about graduate education by statewide coordinating agencies and by state legislatures. Questions are raised about graduate program costs and quality, about program duplication among campuses, and about program efficiency (as measured by student attrition or by

[57] Allan M. Cartter and Wayne L. Ruhter, *The Disappearance of Sex Discrimination in First Job Placement of New Ph.D.s* (Los Angeles, The Higher Education Research Institute, 1975).

[58] *Ibid.*, p. 18.

[59] Committee to Study the Status of Women in Graduate Education and Later Careers, *The Higher, The Fewer* (Ann Arbor, Michigan, The Horace H. Rackham School of Graduate Studies, March 1974), p. vi.

degree productivity). We see no obvious end to these inquiries, and hence a definite need for graduate schools to develop information systems that make it possible to monitor the performance of graduate departments. The capacity to know what is going on within the graduate programs in terms of applications, admissions, enrollments, financial support, attrition, time-to-degree, and first-job placements, with information on each of these variables for women and minority group members also, will not only contribute to improved relationships with external agencies but will also highlight areas where improvement is needed internally. We believe that graduate schools will increasingly take the initiative in this process of information collection and evaluation, rather than be forced to respond passively and defensively to information requests from public bodies.

3 Recommendations

In the preceding chapters we have examined the economic and other forces that are currently shaping the future environment for graduate education. Subject to all of the uncertainty that necessarily accompanies any attempt to look several years ahead, the principal trends that we foresee can be summarized as follows[60]:

1. A steady reduction in demand for new Ph.D.'s to serve as college and university faculty members through the 1980's
2. A reduced rate of growth of R&D expenditures relative to that of the 1960's, and hence reduced growth rates of demand for new Ph.D.'s in such activities (there will undoubtedly be specific research areas, however, that grow much faster than the average)
3. A substantial supply adjustment on the part of students and universities that will reduce the number of new Ph.D.'s awarded well below the numbers projected on the basis of past trends: in many fields, however, the supply of new doctorates will exceed the demand from traditional, discipline-related sources
4. A continuing decline in the total amount of financial support available to full-time graduate students, thereby increasing the relative importance of loans and self-support
5. Some increased enrollment demand by "nontraditional" graduate students, e.g., older students, part-time students, nonresidential students, women returning after child-rearing, and nondegree students

[60] It should be clear that in reporting these trends, we are not endorsing each of them.

6. An increase in the number of women and minority students seeking graduate education

7. Continued focus on accountability, including program evaluation, cost analysis, and other measures of program performance

8. No large new programs to support graduate education, barring a major intellectual breakthrough in some discipline or a substantial shift in national priorities

In light of these projected trends, we believe that federal, state, and institutional policies should encourage a more explicit differentiation of function among graduate programs than currently exists. In recent years, the dominant model of graduate education, in aspiration if not in fact, has been full-time study for the Ph.D. degree by students who have recently received baccalaureate degrees. The great expansion in number of doctorate-granting institutions in the past two decades received much of its internal impetus from the prestige accorded the traditional Ph.D. program and those faculty members associated with it. In addition, during the 1960's, the rapid growth of undergraduate enrollments and of sponsored research in the universities made the decision to start new doctoral programs economically rational because of the substantial complementarities between these activities and graduate education.[61] Graduate students were needed as teaching assistants in the expanding public universities, and they were equally valuable as research assistants on the growing number of sponsored research projects. That unique period of growth has ended, however, and the universities must adapt to the changing circumstances enumerated above.

The national need for traditional Ph.D. programs in all fields will, of course, continue, but not for the number of programs that currently exist. What will be needed are expanded opportunities for "nontraditional" forms of graduate education, serving "nontraditional" graduate students. During the next decade, graduate education must make the transition from a system that has tended to follow a single model of advanced education to the increasing diversity required by changing demographic, economic, and social circumstances.

There are significant roles to be played in this gradual transition by federal and state governments, by private foundations, by professional societies, and by industry, but the most important actions must be taken by the universities themselves. Faculty members, administrators, and graduate students in each university must discuss seriously the type of

[61] Stephen P. Dresch, *An Economic Perspective on the Evolution of Graduate Education*, Technical Report No. 1, National Board on Graduate Education (Washington, D.C.: National Academy of Sciences, 1974).

graduate programs that the institution can reasonably be expected to offer. This review should include a realistic assessment of the quality of current graduate offerings, an inventory of resources available (and lacking), prospects for graduate student support, analysis of recent placements of new graduates, areas of special strength, and so forth. In many of the universities that have introduced doctoral programs in recent years, this review will indicate that the prospects for completing the ambitious development plans of the 1960's are bleak and that the institution should instead concentrate its resources in specific areas where a unique or unusual contribution can be made.

Other institutions may conclude that the resources to continue effective Ph.D. programs are not present but that an important mission does exist in serving a local clientele with part-time, applied master's and professional doctoral programs. Universities in large cities clearly have possibilities not open to those in rural settings; universities with a long tradition of excellence in doctoral education clearly have advantages over newer institutions in that endeavor but may be less flexible in developing programs for new clienteles, universities that have pioneered in developing practitioner degrees, such as the doctor of arts, have an edge over institutions that have not given serious consideration to the strengthened preparation of 2- and 4-year college teachers. *We believe that a national goal in graduate education for the next decade should be the accentuation and further development of these differential strengths, not the continuation of the 1960's trends toward a monolithic system modeled on a Harvard or Berkeley pattern.* Every graduate program worth maintaining should be justified clearly and unambiguously in terms of its particular purposes served, and these should not be vague and rhetorical but highly specific and backed up by hard data. If a program claims to be turning out research scholars, there should be evidence of this in terms of institutional capability and in terms of placements; if it claims to be serving primarily the local community with part-time and continuing education programs, there should be evidence of this in enrollments. When purposes are clear and performance indicators are consistent with these purposes, the problems of public accountability should be much diminished.

Many faculty members will resist the changing emphasis in some graduate programs suggested by this analysis, but we believe that the necessary lines of development described above are consistent with the direction of economic, social, and political change. For graduate education to ignore or resist these changes, by insisting on an outmoded vision of growth and development based on conditions of the 1960's, would render this important sector of higher education less and less pertinent to the needs of the 1970's and 1980's, and therefore less likely to receive social and financial support. The recommendations that follow

are based on specific value judgments regarding the desirable path of development for our system of graduate education, first stated in our report *Federal Policy Alternatives toward Graduate Education*.[62]

If graduate education is to contribute most effectively to society now and in the future—the most general and basic goal—we see action to attain the following goals as urgent.

- *Enhancing the effectiveness and efficiency of graduate education, scholarship, and research.*

Strengthening the national structure for graduate education, scholarship and research by supporting strong programs currently in existence in all regions and ensuring that the most talented students are not denied access to these programs.

Discouraging the proliferation of graduate programs, while ensuring that universities have the necessary resources to develop programs in new fields of study and to meet new social needs. In a period of limited resources for higher education, careful review and elimination of weak graduate programs is one potential source of the resources required for such new programs.

Ensuring that the supply of persons with master's, professional and doctoral level education is in reasonable balance with the long term demands of a complex, technological society.

Sustaining a flow of new research findings, basic and applied, required for both the cultural and material well being of the nation.

Protecting the freedom and the adaptive capacity of the nation's universities.

- *Ensuring the responsiveness of graduate education to the needs of society.*

Ensuring that graduate education contributes to the national commitment to eliminate discrimination based on race, sex, age, and socioeconomic status.

Stimulating changes that will encourage the most effective contribution of graduate education and research to the solution of urgent national problems.

Encouraging responsiveness to the needs of students, including the development of graduate programs that serve part time and older students, as well as the needs of urban residents.

RECOMMENDATIONS FOR FEDERAL POLICY

Federal expenditures for graduate education and research should logically be focused on those activities that have national (or international) benefits, public in nature, and hence not likely to be supported at socially optimal levels by either local jurisdictions or by the private market. Basic research is one obvious area where federal support is essential, since research findings are a classic example of a "public good" that the private market will fail to produce. Similarly, much ap-

[62] National Board on Graduate Education, *Federal Policy Alternatives toward Graduate Education* (Washington, D.C., National Academy of Sciences, 1974), pp. 25–26.

plied research falls into this category and will not be produced by the private sector when the benefits cannot be appropriated by the producer. The "proper" level of federal expenditure for research is the difficult issue to decide, and cost–benefit analyses in this area are unlikely ever to reach a level of sophistication sufficient for precise determination of the optimal level. Consequently, research expenditure must be viewed as investment in social capital, with some projects certain to have very large payoffs while others will not. In recent years, the proportion of GNP devoted to research has declined markedly, and we are concerned by the prospect of a steady deterioration in this country's scientific and technological capability should this decline continue. We reaffirm our earlier recommendation:

- *Federal support for basic research should grow, at a minimum, at the same rate as the long-run growth of real GNP.*

Ensuring the continued strength and intellectual vitality of those universities deeply committed to excellence in research-oriented doctoral education is a second area where federal policies and financial support are critical. The benefits derived from institutions that excel in this particular dimension of quality are clearly national in scope, and the costs of maintaining such programs cannot be borne by state and private expenditures alone. In recognition of this fact, several observers have proposed in recent years that a limited number of universities (25 to 75) be selected as National Universities to receive exclusive federal support for doctoral education and research.[63] We do not support this proposal because we believe a competitive element should always be present in the allocation of federal funds to universities and because selection of a certain number of universities ignores the fact that many institutions excel in research in limited areas, while other generally excellent universities often have areas of weakness not easily corrected. Instead, we support an allocation process that ensures that federal funds for this purpose go to the strongest programs, while allowing for changes over time in the location of strong programs. The competitive, peer-review process for allocating research grants meets our criterion of efficiency for allocating this component of federal funds.

- *We endorse the continued use of the peer-review process for allocating federal research grants in national competition.*

[63] A recent statement is Martin Meyerson, "After a Decade of the Levelers in Higher Education. Reinforcing Quality While Maintaining Mass Education," *Daedalus*, Vol. 104, No. 1, Winter 1975, p. 315.

In a prior report, we argued the case for a nationally competitive fellowship program as an effective way to convey the value and significance that the nation attaches to outstanding undergraduate academic achievement, while also ensuring that the very talented have access to graduate education.[64] We believe that the provision of such fellowships, fully portable and awarded directly to the student on a competitive basis, is an efficient method for providing this type of federal support for graduate students.

• *We reaffirm our earlier recommendation that 2,000 fully portable predoctoral fellowships, covering all academic disciplines, be awarded annually to students on the basis of national competition.*

Of the many resources and facilities required for graduate education, none is more central and vital than the university library. The vast increase in recorded knowledge in recent decades has placed the entire scholarly publication and dissemination "system" under enormous pressure,[65] and the nation's leading research libraries face serious economic obstacles to maintaining excellence in coverage and accessibility. These libraries are important national assets, with widespread benefits that extend beyond their contribution to graduate education, and neither the states nor private sources can be expected to bear the full burden of support. Therefore,

• *We endorse the recent recommendation of the Carnegie Council on Policy Studies that a new, $10 million program of federal support for research libraries be started.*[66]

For those universities that decide to develop or expand programs for "nontraditional" graduate students, the major requirement initially is support for planning, for survey research, for curriculum development, for experimentation, for evaluation, and for student support. Because the

[64] National Board on Graduate Education. *Federal Policy Alternatives toward Graduate Education* (Washington, D.C., National Academy of Sciences, 1974), pp. 52–54.

[65] In recognition of these growing pressures, the American Council of Learned Societies, with financial support from the National Endowment for the Humanities and several private foundations, is sponsoring a major study of the problems facing scholarly journals, university presses, commercial publishers of scholarly books, and research libraries.

[66] Carnegie Council on Policy Studies in Higher Education, *The Federal Role in Postsecondary Education, Unfinished Business, 1975–1980* (San Francisco, Jossey-Bass, Inc., 1975), p. 68.

population served by these programs will be local or regional rather than national, the bulk of operating costs for ongoing programs should ultimately come from local, state, regional, and private sources; however, federal cost-sharing during the developmental and transition stages will be necessary to hasten the diversification of graduate education. A variety of programs should be encouraged, with successful models given wide publicity. Past experience and recent research confirm that universities tend to become more conservative with respect to experimentation and innovation when budgets are tight; thus, additional funds, explicitly earmarked to support the transformation of existing programs to serve new clienteles, will be needed.

• *We recommend that Title IX, Part A, Sec. 901 (a) of the Education Amendments of 1972 be extended and fully funded to provide competitive grants for the development of new forms of graduate education in universities that decide to make major modifications in existing doctoral programs.*

Part A, Sec. 901(a) of the act would provide funds, upon application and on a competitive basis, to universities, ". . . to strengthen, improve and where necessary expand the quality of graduate and professional programs leading to an advanced degree (other than a medical degree) in such institutions." Ironically, this legislation was first authorized in 1968 as a means to upgrade graduate programs along traditional lines; the program was never funded, in part, because of its inopportune timing. We believe that this legislation should be used now to strengthen graduate education by assisting its diversification and capability to serve new groups of potential students not well served by existing programs. The authorization level in recent years has averaged $40 million per year, and we urge full funding at that level.

• *Finally, we recommend the continued use of federal traineeships and training grants as support mechanisms for speeding the development of new areas of knowledge and attracting talent into those areas of study. The new NSF program of energy-related traineeships is an example of a high-priority area for investigation that can be developed most quickly by applying federal funds for that purpose.*

This combination of federal programs should contribute significantly to the development of a diversified system of graduate education, capable of serving an expanded role in society through a greater institutional division of labor. The federal government, through selected and carefully targeted programs of the type recommended above, can help to ensure

high quality in each of the multiple dimensions of advanced education and research.

RECOMMENDATIONS FOR STATE POLICY

Whereas the federal government exercises its influence on the development of graduate education primarily through its financing policies, the states can play a more direct role through the statewide planning process. There is at present great diversity among the states in the organization, capability, and responsibility exercised by the various planning and coordination agencies, and equally great diversity among the states in the number and type of institutions offering graduate work; consequently, recommendations for state action must be sufficiently general to cover the wide range of actual situations.

The state agencies can serve a valuable function in helping to articulate the state interest in graduate education, by conducting research into the types of graduate programs required to serve needs currently not being met, and by encouraging diversification of program offerings among institutions within the state. We believe that the worst type of development for graduate education would be its concentration upon a single purpose and that a central task must be to break this pattern of 1960's thinking in order to encourage the diversity and differentiation that should be the hallmark of the 1970's and 1980's.

- *We recommend that statewide planning and coordinating agencies, operating within the constraints imposed by their charters and by respect for institutional autonomy, encourage diversification and division of effort among the graduate institutions within the state.*

In some states there has been a negative approach to the adjustment problems faced by graduate education, with a dominant focus on eliminating programs and preventing the development of new ones. This approach has inevitably led to conflict situations, with the universities and state agencies in adversary roles. Much of this conflict is understandable, for recent years have been marked by uncertainty and confusion regarding the proper social role of graduate education. We believe that this period of uncertainty is ending, however, and that the necessary lines of future development are emerging with some clarity. It is incumbent, therefore, upon universities and statewide planning agencies to work cooperatively and with proper regard for the rights and responsibilities of each party toward a sound plan for the development of graduate education within the state.

A related issue of growing importance in many states concerns the tuition differential between public and private universities. When federal and private foundation grants for graduate student support were numerous, this price differential was not a critical issue, since relatively few graduate students actually paid their own tuition. The decline in graduate student support programs, however, means that tuition charges will become a more important factor in determining where graduate students enroll. In the absence of public policy initiatives, enrollments will tend to concentrate in the lower-priced (although not necessarily lower cost) public institutions, as the price differential moves steadily against the private universities.

Such a development must not be allowed, since many of the nation's highest quality graduate programs are in the private universities. State policies can play an important role in support of high-quality programs, whether in private or in public universities.

- *We urge each state to develop explicit policies to support graduate programs of established quality, including support for such programs in private universities. State support at the graduate level should not be provided "across-the-board," as in some undergraduate programs, but should be selective and conditioned upon careful evaluation of program quality and public purpose served.*

THE ROLE OF UNIVERSITIES

The greatest responsibility for adapting to changing circumstances necessarily lies with the institutions themselves. External agencies, including governmental bodies, can influence the development of graduate education in both positive and negative ways, but the actual processes of education, the programs offered, the students selected, and the social purposes served by graduate education are largely determined within the universities. The selective reorientation of graduate programs that we see as essential will require considerable creative energy, ingenuity, leadership, and good will from university faculty and administrators.

The internal evaluation of graduate programs that was discussed earlier is an essential first step toward the clarification of mission. Pertinent statistical data should be assembled for each department, including such information as the number and quality of graduate applicants as well as the number accepted and the proportion who enroll, trends in graduate student financial support, placement of recent graduates, and trends in faculty research support and publications. The systematic collection of

such data will provide the basis for a valuable information system for both internal and external use.

Within the university, these data should be combined with budget projections and other pertinent information about the prospects of the individual disciplines to develop a realistic plan regarding the institution's role in graduate education. We are describing nothing more than a systematic academic planning exercise, and many universities will have developed the necessary procedures and undertaken this internal evaluation already; however, in many institutions, graduate programs have not been subject to intense internal scrutiny of the type suggested here. In the absence of this type of serious internal review, resources for graduate education will surely be misallocated, both within the institution and across the total system.

Universities that have only recently begun offering doctoral programs have a particularly important task in deciding whether such programs can and should be continued in light of the grim resource outlook. The funding required to develop high-quality, research-oriented doctoral programs is substantially more than the vast majority of recent Ph.D.-granting institutions are likely to receive in the environment of the 1970's and 1980's. The NBGE study of NSF's Science Development Program, *Science Development, University Development, and the Federal Government,*[67] provides some insight into the dollar cost required to enhance quality. Thirty-one universities received an average of approximately $6 million each under the University Science Development (USD) program, and the NBGE evaluation was able to detect several qualitative improvements in the funded institutions; however, that amount of support was not sufficient to render the group of USD recipients the equal of the nation's leading 15–20 universities. Given the virtual certainty that a program similar to Science Development, in either purpose or funding, will not be available to assist developing universities in the next decade, it makes little sense for the newer universities to persist in efforts to develop a wide range of traditional doctoral programs. *We believe instead that many of the developing universities should be at the forefront in creating graduate programs to serve new clienteles.*

In the past, a common strategy employed by those interested in changing graduate education has been to assume that any change would have to be adopted first by the leading universities to provide credibility and to set the pattern for others to follow. At this time, however, we believe this is the wrong approach, since it continues the stress on a monolithic

[67] National Board on Graduate Education, *Science Development, University Development, and the Federal Government* (Washington, D.C., National Academy of Sciences, 1975).

type of graduate education rather than encouraging diversity among institutions. Universities should, we believe, increasingly specialize in the programs offered and citizens served, and thus it makes no sense to focus all efforts at change on the leading research institutions. One of the principal internal purposes of the program evaluations we have stressed above is to guide institutions toward the type of specialization that is consistent with past performance and the economic outlook.

In addition to the internal use of these data, various external groups will have a legitimate interest in this information. Potential graduate students are among the most important of these external audiences, since the decision to enroll in a graduate program should be based on thorough information. *Students applying to a graduate program should routinely be provided with information from the department regarding labor market prospects in the discipline, placement experience of recent graduates, prospects for financial support while enrolled, and attrition rates from the program.* We reaffirm our commitment to the principle of free student choice in the determination of enrollment levels and distribution among disciplines,[68] but, for this principle to be supportable, students must be provided with better information on which to base their enrollment decisions. A decision to enter graduate education, particularly a doctoral program, involves a substantial private cost to the student (in terms of cash outlay, foregone income, and in the use of time); and, in light of current labor market projections, students should be as fully informed as possible regarding future prospects. It is no longer responsible, in our view, for faculty to assert that more education is always desirable, using that as a rationalization for failure to provide specific information to students contemplating graduate education. Informed student choice will, we believe, contribute significantly to an improved supply–demand balance.

The sharply reduced number of new Ph.D.'s who will find employment on college and university faculties implies a need for changes both in curricula and in attitudes that faculty convey about nonacademic employment. It is impossible to specify in a general way the changes that must take place, since these will differ by discipline and by university. The report of the Panel on Alternative Approaches to Graduate Education, *Scholarship for Society*, provides numerous examples of the types of curricular change that departments might consider, and we hope that a substantial number of academic departments will experiment with these new approaches. The Fund for the Improvement of Postsecondary Education can be expected to provide financial support for the planning and

[68] National Board on Graduate Education, *Doctorate Manpower Forecasts and Policy* (Washington, D.C.: National Academy of Sciences, 1973), p. 5.

development of a limited number of new programs, as will certain private foundations. Professional societies can serve as a forum for discussion of new directions and can publicize successful programs. Industry and government, by providing internships for graduate students and opportunities for faculty members to spend time in off-campus settings, can encourage more effective linkages between graduate education and the nonacademic world. Faculty exchanges between universities and community colleges can heighten the understanding in the university of the particular staffing needs of the 2-year institutions.

Our purpose in discussing these possibilities is not to launch every faculty member in every university into an outreach program, nor to convert graduate education in its entirety to new pursuits, but rather to encourage some institutions and some faculty members to pursue these new lines of service. For this change to occur, faculty members must not be penalized for deviating from traditional norms of scholarship and research; instead, the incentive system must be consistent with the behavior desired. *Thus, an explicit institutional decision to experiment with new types of graduate education must be accompanied with new criteria for judging and rewarding faculty performance.*

Fully as important as curricular change is the need for attitudinal change on the part of faculty. As noted earlier, socialization into the norms and values of the disciplines has been an important aspect of doctoral education. The attitudes and values expressed by faculty members can exert an inhibiting influence on doctoral students, particularly if the message conveyed is that nonacademic employment is only for "second-rate" students. These aspects of the apprenticeship nature of doctoral education must change since the majority of doctoral students in the next 10–15 years will not have careers similar to those of their professors.

During the 1960's, many academic departments stopped admitting candidates for the terminal master's degree in order to concentrate exclusively on doctoral education, a decision reinforced in some instances by pressure from federal agencies. In most institutions, we believe this decision should be reconsidered, with more attention given to reinvigorating and redefining the nature and purpose of the master's degree. *Many of the innovations in graduate education should be attempted initially at the master's level, and thus this degree warrants a resurgence of attention.*

Changes in university policy to create more flexible admissions procedures, to extend eligibility for financial support to part-time students, to alter residency requirements, and to offer courses at more convenient times for working students will be necessary in those universities that emphasize graduate programs for part-time and older students. These

administrative changes are every bit as important as the substantive changes that may occur in curricula and in faculty orientation.

Finally, there is little doubt that some graduate programs will be (and should be) phased out during the next several years. Programs that will fail to receive support are those that do not have unique or unusual strengths and that do not serve specific clienteles. Doctoral programs of clear and established excellence will survive; programs with an applied focus that lead to professional, nonacademic employment will survive; and many of the newer programs for part-time and older students, if well thought out in terms of local needs and opportunities, will be successful. The programs in greatest jeopardy will be those with no distinguishing characteristics in terms of excellence, mission, or clienteles served. Most universities have had limited experience with retrenchment, but the growing pressure on resources will force such decisions to be made. Procedures for phasing out programs will be an essential new component of university governance for the foreseeable future.

We believe that if the approaches suggested in this chapter are followed by those responsible for the development of graduate education, our national capability in this area can be strengthened and diversified, even in a period of limited growth. In addition to the efforts of students, faculty, administrators, employers, and foundation and governmental personnel, a steady flow of pertinent policy research on graduate education will be needed to monitor the system and to suggest new directions. Our final chapter develops a research agenda that we hope will be of assistance to those concerned with the continued strength and vitality of graduate education.

4 Future Research

The charge to NBGE when it was created was open-ended, and in 3 years it was not possible to complete a ". . . thorough analysis of graduate education today and of its relation to American society in the future." The Board necessarily set priorities based on the problems perceived in the early 1970's and authorized the staff to develop a research program around those issues. Many important topics could not be covered, and new issues emerged during the course of the Board's tenure. In this final chapter, we have prepared a brief listing of several important areas that warrant further study, organized under four major headings: Financing and Costs of Graduate Education; Quality Assessment and Program Evaluation; Organization and Performance of Graduate Programs; and Sponsored Research and Graduate Education. The list has been limited to topics of policy concern.

FINANCING AND COSTS OF GRADUATE EDUCATION

1. *State policies toward graduate education and research, including the changing role of state coordinating or governing boards.* A considerable amount of research has been focused on federal policy toward graduate education and research, including the extensive literature on federal science policy.[69] By contrast, much less attention has been de-

[69] For example. See National Science Board. *Toward a Public Policy for Graduate Education in the Sciences* (Washington. D.C.: United States Government Printing Office. 1969): Harold Orlans (ed.). *Science Policy and the University* (Washington. D.C.: The Brookings Institution. 1968); and James Shannon (ed.). *Science and the Evolution of Public Policy* (New York: Rockefeller University Press. 1973).

voted to the role of state governments and coordinating boards in shaping the direction of these activities. As the federal government reduces its support for graduate education, state policies become increasingly important, in fact, states are likely to exercise the dominant influence on the development of the university system in the coming decade.

We need to know much more about state budgeting procedures and about the effects of enrollment-driven funding formulas in an era of declining growth. An analysis should also be made of the various state programs that provide support for private institutions. State support for universities with large numbers of part-time graduate students also needs investigation to determine whether funding procedures encourage or discourage universities from developing graduate programs for such students. The role of coordinating boards needs study from the standpoint of the impact of these boards on the development of graduate education within the state. Are procedures being established to encourage and support diversity of function among institutions, or is a process of homogenization under way? In short, if we wish to understand the dynamics of future university development, we must increase our understanding of the evolving relationships among universities, state legislatures, and state coordinating boards.

2. *Graduate program cost analysis.* At both state and federal levels, the issue of unit costs of graduate education continues to be raised. Economists have pointed out the difficulties involved in generating meaningful cost information in this multiple input, multiple outcome process, and it has become clear that there is no agreement on the proper way to measure unit costs within a university.[70] For an institution with a single function, such as teaching, costs can be determined in a reasonably straightforward fashion. In an institution with a variety of functions that are carried out simultaneously and jointly, however, the assignment of costs is subject to much controversy. And, yet, requests for such information are continually pressed.

In our view, this impasse is indicative of an issue more fundamental than the technical problems of cost analysis. If the requests were taken at face value, the result would be mountains of detailed statistical information of dubious value and of no practical usefulness to policy makers. We thus conclude that the desire for detailed cost figures signifies a more general uneasiness or dissatisfaction with university management and resource allocation, suggesting that the concern for cost data is

[70] Frederick E. Balderston, "Difficulties in Cost Analysis of Graduate Education," in National Board on Graduate Education, *Federal Policy Alternatives toward Graduate Education* (Washington, D.C., National Academy of Sciences, 1974), pp. 89–109.

part of the larger issue of public accountability of universities. If this conclusion is correct, then the first priority should be clarification of the issues involved in accountability rather than a new cost study. The Association of American Universities has proposed a wide-ranging study of university accountability, including cost analysis as one feature, and we strongly endorse that study as the most sensible way to approach the cost question.

It has also been argued that studies of cost should be linked to studies of benefits so that rational calculations can be made regarding the "optimal" scale of graduate activities and so that the proper distribution of costs between the student and society can be determined. We do not believe, however, that the type of cost–benefit analysis that has been applied to water resource projects and other forms of public investment can be readily applied to graduate education, at least in the current state of knowledge. Rather than engage in unresolvable debates over the presence or absence of various social benefits, a more productive effort would include longitudinal studies of career development, focused on the role of advanced education in the career cycle, together with studies of the factors that determine graduate enrollments, including estimation of student responsiveness to changes in cost. Specific information of this type can be linked with the social determination of benefits, expressed through the political process, to design financial policies consistent with public goals.

3. *Graduate student financial support.* Under the general topic of costs and financing is the more specific question of graduate student support. We see three subjects in need of investigation: the impact of reduced federal fellowships, the use of financial need analysis at the graduate level, and the effects of increased reliance on loan finance.

The only remaining nationally competitive federal fellowship program for graduate students is the NSF Graduate Science Fellowship program. More than 5,000 applicants compete for approximately 500 new awards each year. It is widely assumed that unsuccessful applicants (at least those highest ranked) have no difficulty in finding other sources of support for graduate study. This assumption should be checked by a postcard survey sent to the 500 highest ranked applicants who do not receive awards. The survey would determine whether a substantial number of the country's most talented undergraduates are failing to enter graduate school for financial reasons and could be conducted by the National Research Council at very little cost.

The use of financial need in distributing student support is widespread at the undergraduate level and in such professional schools as law and medicine but has not yet become common among graduate schools. We

have written on this subject elsewhere,[71] noting several of the complications involved, but this remains a confusing and divisive issue. Because many graduate departments compete for students by offers of financial support, a decision to consider financial need will render a department less competitive if others do not do likewise. Thus, unless a uniform policy can be adopted by the majority of graduate departments, it seems unlikely that current practices will change.

A statistical survey of current graduate school practices with regard to need-based aid should be made, supplemented by opinion surveys regarding desirable policy sent to current graduate students and graduate faculty. [The Educational Testing Service (ETS) would be a logical organization to undertake the surveys, since ETS administers the Graduate and Professional Schools Financial Aid Service.] A commission should be appointed by an appropriate national organization, such as the Council of Graduate Schools, to review the analysis of survey findings and to make specific recommendations for graduate school policy.

Finally, a thorough empirical study of the impact of increased graduate student borrowing is needed. We know surprisingly little about the distribution of debt, its effect on enrollment decisions, and the problems of repayment under existing arrangements. Since it seems likely that graduate student borrowing will increase and become a major source of support, this study should have high priority. The Division of Insured Loans within the U.S. Office of Education can provide much of the necessary data.

In each of these proposed studies special attention should be paid to support patterns for different age groups, different racial and ethnic groups, and for women. Differences in type and amount of support undoubtedly contribute to differential participation rates in graduate education, and these studies could contribute significantly to our understanding in that area.

QUALITY ASSESSMENT AND PROGRAM EVALUATION

4. *Improved and diversified quality indicators.* Quality is at the heart of graduate education, and yet our techniques for measuring quality are still in a rudimentary state. In addition, if graduate education is to diversify, as we have argued it should, then we need to assess multiple

[71] David W. Breneman, *Graduate School Adjustments to the "New Depression" in Higher Education*, Technical Report No. 3, National Board on Graduate Education (Washington, D.C., National Academy of Sciences, 1975), Commentary by National Board on Graduate Education, pp. 7–8.

dimensions of quality, and the simple reputational survey that has sufficed to date will be inadequate.

A further need for quality indicators resides in our current inability to document with precision changes in graduate program quality that occur over time. Many observers believe that the financial squeeze of recent years has had a serious effect on the quality of graduate education, but no broadly accepted method exists whereby to prove or disprove this belief. The NBGE evaluative study of the Science Development Program[72] used several objective indicators to assess changes in quality, and the Council of Graduate Schools and the Graduate Record Examination Board, in cooperation with the Educational Testing Service, are currently field-testing a more extensive set of quality indicators proposed by a panel of graduate deans. This subject requires (and warrants) continued research efforts.

5. *Status of the master's degree.* As research and graduate education expanded during the past two decades, the interest of many institutions was focused on the doctorate. A related and, we believe, unfortunate development was a decline in the status of the master's degree. At some universities the master's degree has been awarded primarily as a "consolation prize" to those unable to complete the doctorate. It has also been frequently awarded to doctoral candidates as an uneventful steppingstone after a year or two of successful progress toward the final degree. The award of nonthesis master's degrees may have been based on sound educational policy but in practice has contributed to the denigration of the degree.

We believe that the master's degree may provide the basis for responding to many of the pressures facing graduate education. Many of the potential new students are less interested in research careers than in continuing education and appropriate certification. The master's degree offers a locus for experimentation with new degree programs and new degree audiences. A thorough study should be made of this degree, focusing on its enhancement as a viable academic degree and its use in responding to an era of new students and new priorities.

6. *The potential new clienteles for graduate education.* In the previous chapter, we stressed the importance of expanding access to graduate education for older, part-time, nonresidential, and otherwise "nontraditional" students but also noted that not enough is known about the demand for graduate education on the part of such students. We need to know more about the types of programs wanted, how to finance them,

[72] National Board on Graduate Education, *Science Development, University Development, and the Federal Government* (Washington, D.C.: National Academy of Sciences, 1975).

and what the barriers are to participation. The necessary information can be gathered by a combination of survey work, case studies, site visits, conferences, and experimentation. Much of the existing research in this area has been devoted to undergraduate education, the time has come for a parallel effort at the graduate level.

ORGANIZATION AND PERFORMANCE OF GRADUATE PROGRAMS

7. *Microstudies of university decision making and resource allocation.* The growing interest in developing performance measures for institutions of higher education and the related attempt to relate resource inputs to measurable outputs have not been accompanied by an equal effort to understand institutional behavior. So long as the internal processes of decision making and resource allocation are poorly understood, attempts to influence performance will often be misdirected.

Consider, for example, the issue of length of time to degree and attrition from doctoral programs. Many observers have bemoaned the "Ph.D. stretchout" and high attrition rates, but effective ways to address this problem have been hampered by poor understanding of its causes. In an attempt to create more "efficient" doctoral programs in the humanities and social sciences, the Ford Foundation granted over $41 million to 10 universities for graduate student support, on the theory that guaranteed support, combined with a departmental commitment to rationalize the doctoral program, could raise performance in these departments to the level of the sciences. An evaluation of this program, to be undertaken as part of a broader research project at the Brookings Institution, should shed valuable light on the determinants of departmental performance.

A related area for investigation involves the question of structural change in the organization of graduate programs to increase flexibility in a period of limited growth. New disciplines (e.g., biochemistry) have been recently introduced into university structures, in many cases as new departments in the organization. The development of several such departments should be analyzed as case studies. What are the forces that lead to departmental permanence? Is it likely that new departments with independent budget and tenured faculty will be introduced in a time of no-growth institutional budgets? In a zero growth economy will universities be able to terminate departments and transfer faculty as a prelude to introducing a higher priority academic unit, or are universities effectively locked into their present structures? As new units evolve, how are they organized, do they have their own budgets, do they recommend promotions, are they within or between departments, do they report to the graduate dean? Again, case studies would be valuable.

Implicit in this discussion is the assumption that a number of institutions have responded to this problem in varying ways. A review of such "experiments" may prove very profitable to other schools grappling with analogous problems.

8. *Comparative studies.* During its life, NBGE focused exclusively on graduate education in the United States. We have been impressed, however, by the valuable insights that can be gained by comparative studies of educational systems in several countries. The recently completed three-volume study, *The Research System,*[73] sponsored by the Organization for Economic Cooperation and Development, is an excellent example of the value of such transnational studies. Should a successor organization to NBGE be established, we recommend that its charter include an international component.

9. *Longitudinal studies of cohorts of entering graduate students.* For several years, the American Council on Education, through its Cooperative Institutional Research Program developed by Alexander Astin, has been assembling longitudinal data files on entering classes of college freshmen. The recently published study *Five and Ten Years after College Entry*[74] reported in detail on the experiences of the entering classes of 1961 and 1966. Although longitudinal files are expensive to develop and require several years to build up, we think a comparable effort at the graduate level should be seriously considered. It would enable us to respond to two types of questions: what happens to the many students who do not receive degrees, and what is the profile of those who do successfully complete degree programs? Many specific issues could be addressed with such data, including time to degree; field switching; how attrition varies by sex, race, and discipline; and impact of financial support.

A study of this kind—involving large numbers of students as they progress through graduate school and beyond—could best be done by a group with substantial experience in conducting such longitudinal studies. The Educational Testing Service, the National Research Council, the American Council on Education, and the Higher Education Research Institute are possible candidates.

SPONSORED RESEARCH AND GRADUATE EDUCATION

10. *Research and graduate education as joint products.* In the United States, research and graduate education have been strongly

[73] J. J. Salomon *et al., The Research System,* 3 vols. (Paris. Organization for Economic Cooperation and Development, 1972, 1973, 1974).

[74] Elaine H. El-Khawas and Ann S. Bisconti, *Five and Ten Years After College*

coupled. Ph D 's and research findings have been joint products. Graduate students are important to the economical production of research, with the student benefiting as well. During the past this process worked well because the demand for doctorates and for research were equally strong. However, the prospective reduced academic demand for new Ph.D.'s raises serious questions. If the number of graduate students in the sciences continues to decline, what may be the effects on academic science and on graduate education? To the extent that a major function of academic science is to train students, faculties and universities may choose to do less academic research. Alternatively, the volume of academic science may be sustained or expanded, but if there are not enough graduate students to staff the academic research undertaking, more of the staff will be composed of semipermanent research associates and technicians. This will tend to change the purpose of and the environment for academic science. These potential changes in the character and scale of academic science have important implications. They should be carefully evaluated so that choices may be informed by full consideration of the forces at work and the consequences of alternative courses of action.

11. *An assessment of university research capability.* A systematic investigation of the current status of university research capability is needed, going beyond the aggregate expenditure trends reported by NSF. The impacts of financial cutbacks, of the increased emphasis on applied research, and of reduced growth in faculty numbers, including the problems created by high tenure ratios, need careful evaluation at the institutional level. This study should serve as a benchmark so that subsequent evaluations can be compared to the situation in 1976.

We are pleased to note that several activities are planned that should cover this topic adequately. The Association of American Universities, with support from the National Science Foundation, is undertaking a study of the status of research at universities. A similar study, limited to biomedical research but not limited to universities, is being carried out by the President's Panel on Biomedical Research. Finally, the American Council of Learned Societies is sponsoring a major study of scholarly publication, including investigation of the economic plight of research libraries, academic journals, and university presses.

12. *Maintaining research vitality with limited faculty turnover.* The current age distribution of faculties in many universities suggests that little turnover will occur during the next 15 years, and the slowdown of enrollment growth means that there will be limited expansion demand. The average age of faculty members can be expected, therefore, to in-

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Entry, American Council on Education Research Reports, Vol. 9, No. 1 (Washington, D.C.: American Council on Education, 1974).

crease significantly over this period. In many disciplines, the early years are the most creative, and thus ways must be found to ensure faculty positions for a steady flow of younger scholars. The recent announcement by the American Council of Learned Societies of a competition for about 30 research fellowships in which only humanities scholars not less than 1 year or more than 3 years beyond receipt of the Ph.D. degree are eligible is an encouraging development. It is to be hoped that similar opportunities can be established.

Additional ideas have been mentioned in the literature and elsewhere and are no doubt being tried; these include faculty exchanges, personnel exchanges with government and industry, early retirement, changes in tenure policy, more flexible sabbatical policies, and the conversion of teaching assistantships into faculty positions. To the best of our knowledge, however, no one has systematically examined the range of ongoing activities and evaluated their potential for easing the problem. Such a study would be a valuable service for universities concerned with this issue.

CONCLUSION

These studies indicate the direction of future policy research that we believe should be undertaken in the area of graduate education. As noted, several of these topics are being explored by existing research groups, but many are not. With the termination of NBGE, no organization will exist devoted exclusively to investigation of current issues and problems in graduate education, a troubling fact given the importance of graduate education to our society. Our final recommendation, therefore, addresses this point:

We recommend that, after an appropriate interval, the Conference Board of Associated Research Councils convene a group of interested individuals to discuss the current status of graduate education and to determine whether the need exists to establish a successor organization to NBGE.

Appendix

TASK FORCE ON
FEDERAL POLICY ALTERNATIVES TOWARD
GRADUATE EDUCATION

David Henry (Chairman), National Board on Graduate Education; and Professor of Higher Education, University of Illinois
Robert Alberty, Dean, School of Science, Massachusetts Institute of Technology
Frederick Balderston, Department of Business Administration, University of California, Berkeley
William Bouwsma, Department of History, University of California, Berkeley
Howard Bowen, Professor of Economics and Education, Claremont University Center
Robben Fleming, President, University of Michigan
Norman Hackerman, President, Rice University
Robert Hartman, Senior Fellow, The Brookings Institution
Joseph Kershaw, Professor of Economics, Williams College
Frederick Thieme, Professor of Anthropology, University of Colorado

ADVISORY PANEL ON SCIENCE DEVELOPMENT: AN EVALUATION STUDY

John Millett (Chairman), Vice President and Director, Management Division, Academy for Educational Development

Donald Campbell, Professor, Department of Psychology, Northwestern University

Paul Chenea, Vice President, Research Laboratories, General Motors Technical Center

Robert Christy, Provost, California Institute of Technology

J. Patrick Crecine, Professor, Institute of Public Policy Studies, University of Michigan

Hans Laufer, Professor, Biological Sciences, University of Connecticut

J. Ross MacDonald, Professor, Department of Physics, University of North Carolina

Lincoln Moses, Dean of Graduate Studies, Stanford University

ADVISORY PANEL ON MINORITY GROUP PARTICIPATION IN GRADUATE EDUCATION

Frederick Thieme (Chairman), Professor of Anthropology, University of Colorado

Herman Branson, President, Lincoln University

Elias Blake, President, Institute for Services to Education, Washington, D.C.

W. D. Cooke, Vice President, Research, Cornell University

Joseph Cosand, Director, Center for the Study of Higher Education, University of Michigan

Eugene Cota-Robles, Vice Chancellor—Academic Affairs, University of California, Santa Cruz

Cyrena Pondrom, Assistant Chancellor, University of Wisconsin

Lois Rice, Vice President, College Entrance Examination Board, Washington, D.C.

Kenneth Tollett, Director, Institute for the Study of Educational Policy, Howard University

Leonard Spearman, Acting Associate Commissioner for Student Assistance, U.S. Office of Education

ADVISORY PANEL ON GRADUATE EDUCATION AND COMMUNITY COLLEGES

Allan M. Cartter (Chairman), Professor in Residence, University of California at Los Angeles

Ernest Anderson, Associate Professor of Higher Education and Coordinator of University–Junior College Relations, University of Illinois at Urbana

Elof Carlson, Professor of Biology, State University of New York at Stony Brook

Everett W. Ferrill, Professor of History, Ball State University

Maurice Mandelbaum, Professor of Philosophy, The Jonns Hopkins University

Peter Masiko, Jr., President, Miami-Dade Community College

Richard C. Richardson, Jr., President, Northampton County Area Community College

William Toombs, Assistant Director, Center for the Study of Higher Education, The Pennsylvania State University

NATIONAL BOARD ON GRADUATE EDUCATION PUBLICATIONS

Board Reports

1. *Graduate Education. Purposes, Problems and Potential.* November 1972, 18 pp.
2. *Doctorate Manpower Forecasts and Policy,* November 1973, 22 pp.
3. *Federal Policy Alternatives toward Graduate Education.* March 1974, 127 pp.
4. *Science Development, University Development, and the Federal Government,* June 1975, 48 pp.
5. *Minority Group Participation in Graduate Education.* Forthcoming, 1976.
6. *Outlook and Opportunities for Graduate Education.* December 1975, 73 pp.

Technical Reports

TR. 1. *An Economic Perspective on the Evolution of Graduate Education,* by Stephen P. Dresch, March 1974, 76 pp.

TR. 2. *Forecasting the Ph.D. Labor Market: Pitfalls for Policy,* by Richard Freeman and David W. Breneman, April 1974, 50 pp.

TR. 3. *Graduate School Adjustments to the "New Depression" in Higher Education,* by David W. Breneman, with a *Commentary by the National Board on Graduate Education.* February 1975, 96 pp.

TR. 4. *Science Development: An Evaluation Study,* by David E. Drew, June 1975, 182 pp.

TR. 5. *Graduate Education and Community Colleges. Cooperative Approaches to Community College Staff Development,* edited by S. V. Martorana, William Toombs, and David W. Breneman, August 1975, 137 pp.

Other Publications

An Annotated Bibliography on Graduate Education, 1971–1972, October 1972, 151 pp.

"Comment" on the Newman Task Force Report on the Federal Role in Graduate Education, June 1973, 13 pp.