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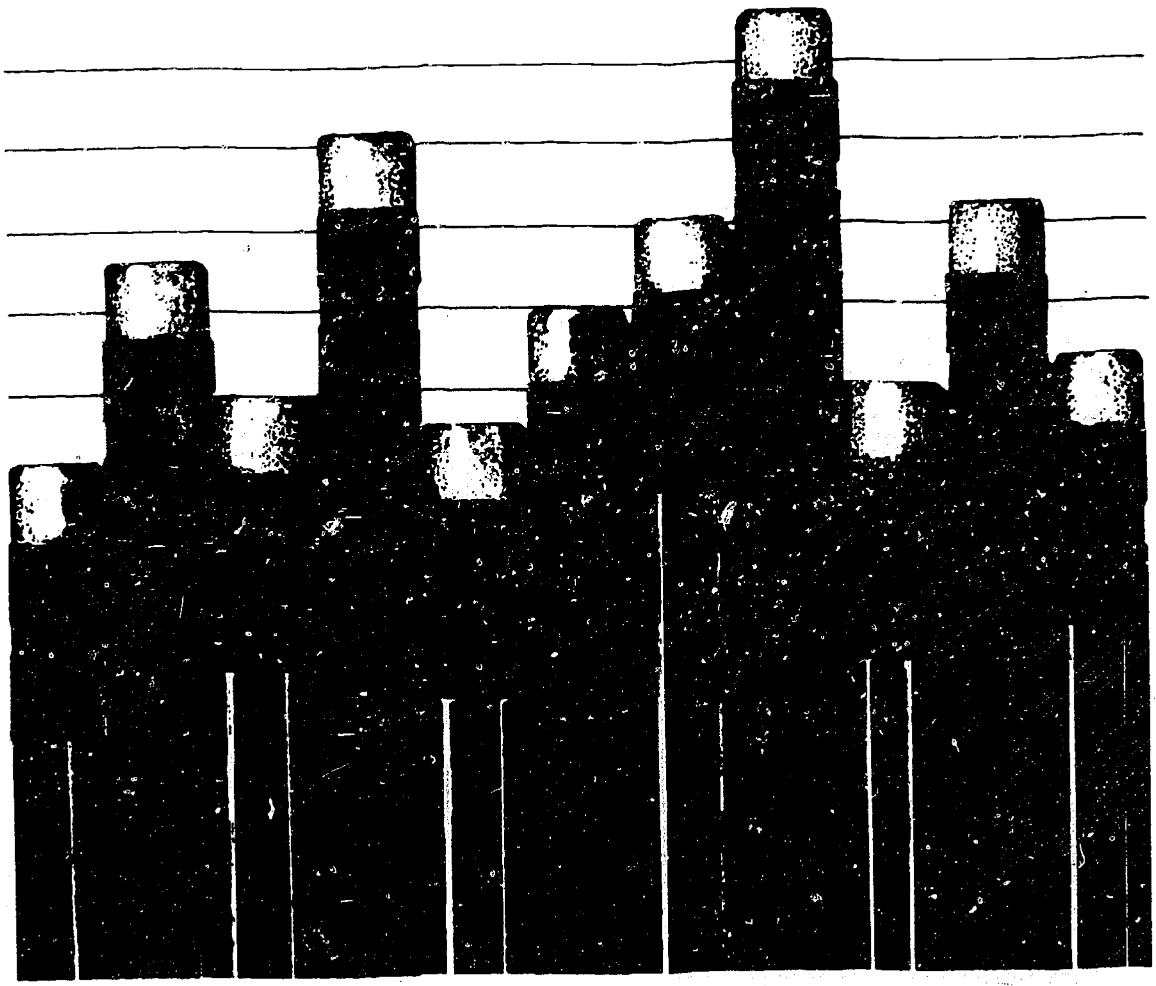
ABSTRACT

This publication is intended as a useful summary of available basic information on educational research and development (R&D). It was planned for several audiences: the staff of the National Institute of Education; other personnel in federal, state, and local governments; members of Congress; researchers and developers; trainers; administrators of R&D programs; and interested members of the general public. The databook has seven chapters, beginning with the introduction. Chapter 2 presents a statistical overview of the status of American education which provides a context for the subsequent discussion of educational research, development, dissemination, and utilization. Chapter 3 describes the complementary sponsorship roles of federal, state, and local governments; federal coordination efforts; and foundation and commercial sponsorship of R&D in education. Three chapters dealing with the structure and process of educational R&D follow. Chapter 4 deals with the conduct of R&D; Chapter 5 with the dissemination of R&D products; and Chapter 6 with the utilization of R&D products. These three chapters focus on organizations and personnel that provide capability for each R&D function, as well as on activities encompassed by each function. Chapter 7 begins a discussion of emerging factors that will affect educational R&D in the future. Tables are provided throughout for users who need quantitative details, and at the same time, the narrative highlights the major points supported by the quantitative information. Descriptions of many R&D products are included, and for those seeking greater detail, the bibliography identifies sources in which more extensive descriptions and tabulations appear. (MM)

1976

DATABOOK

the status of education research and development in the united states



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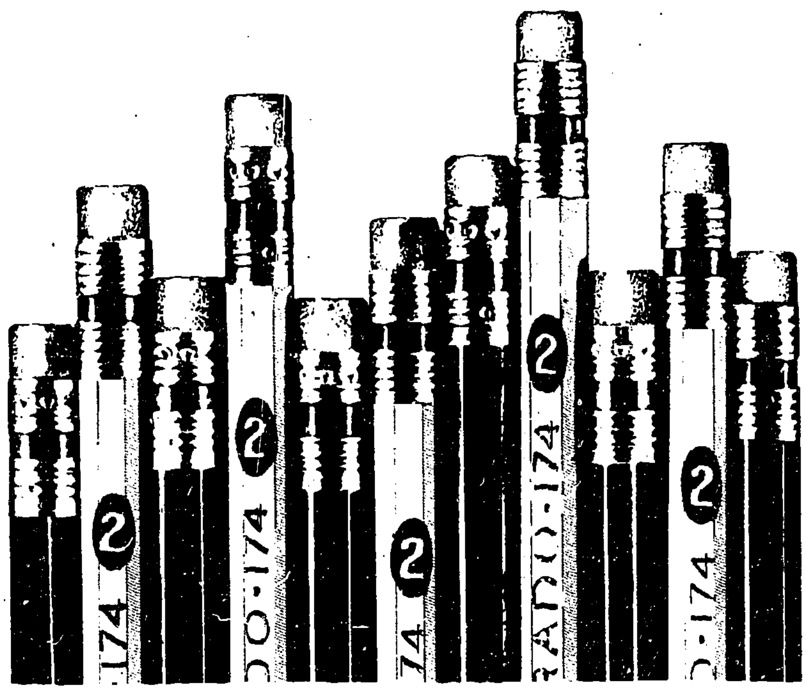

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FOREWORD

The National Institute of Education was established in 1972 to provide a focal point for Federal research and development (R&D) in education. More than 2,500 institutions conduct some form of education R&D, yet there is little coordination within the R&D system as a whole. For this reason, the Institute's legislative mandate gave it the leading role in studying that system and in improving the way in which it functions.

The *1975 Databook* is the Institute's first attempt to collect and analyze the best available information about the Nation's education R&D enterprise. It is also part of a larger initiative. Through its Dissemination and Resources Group, NIE is developing a systematic data base to monitor trends in education R&D. The Institute is also working to strengthen specific components of that system.

We would like to encourage readers of this initial *Databook* to suggest ways in which we can improve future editions. Because this report is a first effort, some information is incomplete and data gathered from different sources may not always compare. Nonetheless, it is the most comprehensive such report available, and we believe it will prove useful to its readers.

Harold L. Hodgkinson

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Director

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CHAPTER 1
INTRODUCTION

A. SCOPE

This *Databook* is intended as a useful summary of available basic information on education research and development (R&D). It was planned for several audiences: the staff of the National Institute of Education (NIE) itself; other personnel in Federal, State, and local governments; Members of Congress; researchers and developers; trainers; administrators of R&D programs; and members of the public.

Tables are provided for users who want quantitative details. At the same time, the narrative portions of the text summarize major points. In an effort to accommodate the requests of legislators and the public, descriptions of R&D activities and products have been included. For persons seeking more detail, the bibliography identifies sources in which more extensive descriptions and tabulations appear.

In this first edition, which predates the completion of several related NIE studies, many tables are derived from established Federal data sources. These sources include *Science Indicators* and other publications of the National Science Foundation; *Digest of Education Statistics* and other publications of the National Center for Education Statistics; *Survey of Earned Doctorates*, published by the National Research Council; the annual report of each agency that funds education R&D; and a variety of NIE data sources.

The *Databook* has seven chapters, including this introductory chapter. Chapter 2 presents a statistical overview of the status of American education which provides a context for the subsequent discussion of education research, development, dissemination, and utilization.

Chapter 3 describes the complementary sponsorship roles of Federal, State, and local governments; Federal coordination efforts; and foundation and commercial sponsorship of R&D in education.

Three chapters dealing with the structure and process of education R&D follow. Chapter 4 deals with the conduct of R&D; Chapter 5 with dissemination of R&D products; and Chapter 6, with the utilization of R&D products. These three chapters focus on organizations and personnel that provide capability for each R&D function, as well as on activities encompassed by each function.

Chapter 7 begins a discussion of emerging factors that will affect education R&D in the future. It is expected that future trends will be discussed in greater detail in later editions of the *Databook*.

B. PERSPECTIVES ON EDUCATION R&D

Education R&D involves change and rigor. Its goals are to understand, influence, and produce educational improvement. Such R&D tries to give decisionmakers in education the best available, systematically derived information. It also tries to be instrumental in implementing planned changes in educational practice.

Change is a normal part of all social institutions and has many sources. What distinguishes education R&D as a source of change is its experimental approach—an insistence upon rigor in the formulation of problems and explanations, and the systematic collection of empirical evidence for use in checking answers, developing products, and devising appropriate action.

Use of the term "action" implies a departure, in the *Databook*, from traditional connotations of R&D—i.e., R&D on the model born of World War II military-industrial research of the physical sciences and engineering applications. As used here, R&D aims at binding together the spheres of systematic inquiry and subsequent action. It covers the production and use of new knowledge: research, development, dissemination, evaluation, and utilization tasks. Disciplinary research is included, as is the systematic use—incorporation into everyday operations—of the results of R&D in education. In recent years, a number of researchers and policymakers in education have begun to use the broader definition of education R&D as "knowledge production and utilization."

Bringing systematic cognitive inquiry into the world of action proceeds on the assumption that rational, systematic knowledge has important contributions to make in the conduct of human affairs. This falls short of the assumption that R&D is the sole determinant of such actions, or that it can provide solutions to all examined problems. Knowledge concerning education R&D, is, after all, limited, and human factors and values play a large role in education. Although an important source of change, R&D is by no means the only source. "Environmental" forces affect education and continually alter its features both subtly and directly—forces such as demographic developments; political, economic, and legal decisions; and cultural shifts in the population. Education, as does any other human activity, constantly produces changes from within as well, in both planned and spontaneous ways. However, education R&D is the source of solidly grounded knowledge and practice from which some future changes in the conduct of education will emerge.

C. A "SOCIAL INDICATORS" APPROACH

The *Databook* was developed within the framework of a "social indicators" literature that is only about 10 years old, although antecedents can be found in the 19th century. A pioneering work of this type is the 1966 volume, *Social Indicators*, edited by Raymond Bauer. This book explored the concepts and methods of a continuing social audit.

Bertram Gross then urged that measures be anchored in conceptual models of the social system. Gross advocated "intermediate abstractions" of social welfare emphasizing quantifiable economic variables. Thus, for "grand abstractions" such as "peace, security, freedom, liberty, autonomy, self-determination, and equality," the corresponding intermediate abstractions were exemplified by full employment and fair employment.

In 1968-69, the Department of Health, Education, and Welfare (HEW) produced *Toward a Social Report*, a document summarizing available indicators of health and illness; physical environment; income and poverty; public order and safety; learning, science, and art; participation and alienation. The *Report* criticized the quantity and quality of indicators that were available:

> Good decisions must be based on a careful evaluation of the facts. . . .Yet, those policymakers and citizens who are concerned about the condition of American society often lack the information they need to decide what, if anything, should be done about the state of our society.[1]

The Russell Sage Foundation instituted a significant and continuing program of study on social indicators in 1965. The first Russell Sage report, *Indicators of Social Change*, edited by Eleanor Sheldon and Wilbert Moore, appeared in 1968. It included two chapters of special relevance to R&D in education: "Measurement of Knowledge and Technology," by Daniel Bell, and "Trends in Output and Distribution of Schooling," by Beverly Duncan.

Another Russell Sage report, *Indicators of Trends in American Education*, was produced in 1969 by Abbott Ferriss. It presents time-series data basic to the description and analysis of changes in American education. Unfortunately for our purposes, the Ferriss report does not deal with education R&D.

The latest and most rigorous Russell Sage publication is *Social Indicator Models*, edited by Kenneth Land and Seymour Spilerman (1975). In his own contribution to the book, Land stresses the "informative value" a statistic can derive from its location in a particular model of a social process. He argues that it is the organizational and distributive consequences of input variables, such as "numbers of doctors or policemen," that transform expenditures into output indicators. In recent conceptual discussions like Land's, an effort is being made to focus attention "upstream" from output indicators toward input and process variables that are causally related to the slow-to-change, hard-to-measure output indicators.

1. Department of Health, Education, and Welfare, *Toward a Social Report* (Washington: Government Printing Office, 1969), p. 95.

In *Social Indicators 1973,* the Office of Management and Budget (OMB) provided more complete data for each of the social areas discussed in HEW's *Toward a Social Report* of 5 years earlier. This most attractive and sophisticated of reports on social indicators presents a number of indicators of educational attainment and outcome. As a reminder that the social indicators approach is new and unpolished in many respects, a long critique of *Social Indicators 1973* resulted from a symposium convened by the Social Science Research Council. According to the critique, the education section had four main defects: (1) the need for clarification of basic concepts, (2) the gap between concepts and measures, (3) the problem of scope, and (4) the problem of standards. In addition, education R&D is considered to be beyond the scope of the OMB report.

The National Science Foundation (NSF) reported scientific effort in the United States in *Science Indicators 1972*. The Foundation's indicators included the international position of U.S. science and technology, resources for research and development, basic research, science and engineering personnel, and institutional capabilities. Time extended from the early 1960's into the 1970's whenever possible. *Science Indicators* also related public opinion concerning the U.S. scientific effort to parallel "hard" measures such as funding, or personnel.

The Condition of Education is the first in a new series which attempts to describe and interpret the condition of U.S. education in a comprehensive statistical report. The first edition was released in 1975 by the National Center for Education Statistics (NCES). After establishing a context with such indicators as voter participation, labor force participation, and income according to years of education, the report describes the educational attainments of American youth, school financing, and the education enterprise in elementary, secondary, and postsecondary settings.

An important precursor of the *Databook* was *Educational Research and Development in the United States,* produced in 1969 by Hendrik Gideonse and staff of the National Center for Educational Research and Development (NCERD), U.S. Office of Education (OE). The Gideonse report drew upon Federal data, site visits, interviews with education researchers and developers, and earlier studies such as *The Organization of Educational Research in the United States,* reported in 1966 by Sam Sieber and Paul Lazarsfeld.

This book should be viewed as being within this social indicator tradition. However, there is a scarcity of true indicators relevant to education R&D, causing at least one investigator looking at monitoring issues to question the utility of the social indicators' framework.[2] Certainly, successful execution of the social indicators' approach must be considered a goal of a monitoring program rather than a description of present reality.

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2. O. W. Markley, *The Normative Structure of Knowledge Production and Utilization in Education*, Vols. 1 and 2 (Menlo Park, Calif.: Stanford Research Institute, 1976).

CHAPTER 2
AN OVERVIEW OF AMERICAN EDUCATION

This chapter provides a relatively brief statistical survey of American education, including such information as the number of school districts; number of schools; number of students enrolled at elementary, secondary, and higher levels of education; number of teachers; expenditures on education; and educational attainments.[1]

The most significant aspect of American education in the 20th century has been its growth in absolute numbers. At the turn of the century, 17 million students attended educational institutions. Despite a small downturn in enrollment starting in 1971, nearly 59 million students are presently enrolled.

In proportion to the total national population, however, the relative magnitudes have shifted much less dramatically. Twenty-four percent of the population attended school in the year 1900. By 1974, the figure was 28 percent. The total population has "grown older," which counterbalances the strong trend toward a widened age range during which formal education takes place.

Totaling the numbers of students, teachers, administrators, and other persons involved in education, the authors of the *Digest of Educational Statistics* have commented:

Education is today the major occupation of 62.2 million people in the United States. That figure, along with the fact that more than $96 billion will be spent by educational institutions this year, lends credence to the contention that education is now the Nation's largest enterprise.[2]

The tables in this chapter are organized in six general categories—school districts and schools, enrollment, teachers, expenditures for education, public libraries and public television as community resources, and educational attainment.

A. SCHOOL DISTRICTS AND SCHOOLS

The number of school districts in the United States has been declining sharply for decades. In 1945 responsibility for public education was divided among more than 100,000 districts. Consolidation had reduced the number of districts to 55,000 by 1955 and to 27,000 by 1965. About 10,000 additional districts were consolidated out of existence between 1965 and 1970.

As shown in Table 2.1, only about 10 percent of the 17,238 districts operating in 1971-72 had

1. For detail on trends and projections consult *The Condition of Education* and the *Digest of Education Statistics*, Annual Publications of the National Center for Education Statistics (NCES).

2. National Center for Education Statistics, *Digest of Educational Statistics, 1973 Edition* (Washington: Government Printing Office, 1974).

TABLE 2.1. *Number of public school districts and number of pupils enrolled, by size of enrollment: 1971-72*

	School districts		Pupils	
Size of enrollment	Number of districts	Percent	Number in thousands	Percent
Total	**17,238**	**100.0**	**48,010**	**100.0**
25,000 or more	194	1.1	14,084	29.3
6,000-24,999	1,413	8.2	15,132	31.5
1,200-5,999	5,515	32.0	14,953	31.1
Less than 1,200	10,116	58.7	3,841	8.0

Source: NCES, *The Condition of Education* (Washington: Government Printing Office, 1976).

enrollments of 6,000 students or more. Only 1 percent (194 districts) could be classified as large—with enrollments of 25,000 students or more; however, the 194 large districts enrolled 29.3 percent of the pupils. Conversely, only 8 percent of the pupils were found in districts with enrollments under 1,200.

In 1971 there were about 10,000 schools at all levels in the United States. Large as this number seems, it is only 55 percent of the 200,000 schools that were operating in 1945. Tables ? ˜ provide information on the distri' public and nonpublic sectors of e ... secondary schools and of institu ... education.

TABLE 2.2. *Percentage distribution of public and nonpublic elementary and secondary schools: 1973-74*

Schools	Total	Public	Nonpublic
Total (106,797)	**100.0**	83.8	16.2
Elementary	72.8	59.9	12.9
Secondary	27.2	23.9	3.3

Source: NCES, *The Condition of Education* (Washington: Government Printing Office, 1976).

TABLE 2.3. *Percentage distribution of public and nonpublic institutions of higher education, by level of instruction: 1974-75*

Level of instruction	Total	Public	Nonpublic
Total (2,747)	**100.0**	44.2	55.8
2-year colleges	36.5	27.9	8.6
4-year colleges	57.7	12.9	44.8
Universities	5.8	3.4	2.4

Source: NCES, *The Condition of Education* (Washington: Government Printing Office, 1976), and unpublished data.

B. ENROLLMENT

After an alltime high of 59.7 million students in 1971, enrollment has stabilized at around 59 million (not including adult nondegree enrollment). This stabilization parallels that of the national population. Within the 59 million total, elementary enrollment has declined while both secondary enrollment and college enrollment continue to increase.

Of particular interest in Table 2.4 is the extent of prekindergarten enrollment that characterized the early 1970's. That nearly 1.6 million 3-to 5-year-olds were enrolled in 1974 in formal programs can be attributed both to growing public awareness of children's readiness to learn cognitive and social skills during the prekindergarten years and to a set of opportunities provided by federally initiated programs such as Head Start. (A point of comparison for the 1974 total of 1.6 million is the 1967 prekindergarten enrollment of 0.7 lion.) The importance of educational program ... ompensation for social and economic disa... tages before children enter elementary scho... been emphasized since *Equality of Educational Opportunity*[3] was published in 1966.

TABLE 2.4. *Estimated public and nonpublic enrollment by level of instruction, selected years*
(In thousands)

Level of instruction	Total	Public	Nonpublic
Prekindergarten:			
fall 1974	1,603	422	1,182
Kindergarten to grade 8:			
fall 1975	34,000	30,570	3,430
Grades 9-12: fall 1975	15,610	14,370	1,240
Higher education:			
fall 1974	10,224	7,989	2,235
Adult education: 1972	15,734	NA	NA
Adult basic education: 1972	821	NA	NA

Sources: NCES, *The Condition of Education* (Washington: Government Printing Office, 1976); NCES, *Digest of Educational Statistics, 1973 Edition and 1975 Edition* (Washington: Government Printing Office, 1974, 1976); NCES, *Preprimary Enrollment* (Washington: Government Printing Office, 1974).

Long-term trends in enrollment show that schools have had to adjust to the demanding and expensive task of providing instruction for a larger proportion of older students. In 1900 there were 23 elementary students for every secondary student; in 1970, the ratio was less than 3 to 1.

Higher education, by far the most expensive level of instruction that society undertakes, was enjoyed by fewer than 0.25 million students in

3. James S. Coleman, Ernest Q. Campbell, Carol J. Hobson, James McPartland, Alexander M. Mood, Frederic D. Weinfeld, and Robert L. York, *Equality of Educational Opportunity* (Washington: Government Printing Office, 1966).

1900—less than half of 1 percent of the population. By 1975, more than 9 million people, or 4 percent of the population, were participating in some form of higher education.

Enrollment trends, as shown in Table 2.5, can also be analyzed in terms of percentages of population enrolled at each level. The percentages show more clearly than actual numbers of students that the elementary schools are losing enrollment proportionately while the secondary schools and colleges are gaining enrollment.

C. INSTRUCTIONAL STAFF

Table 2.6 shows the size of the instructional staff at each level in public and nonpublic schools. Although half a million more women than men were teaching in 1970, the ratio of women to men on the staff varies according to the instructional level. In elementary schools, women instructors far outnumber men (1.6 million to 0.7 million). In secondary schools, the ratio of women to men is balanced at half a million each. In higher education, men far outnumber women (0.4 million to 0.1 million).

TABLE 2.6. *Estimated number of classroom teachers in elementary and secondary schools, and total instructional staff for resident courses in institutions of higher education: fall 1975*
(In thousands)

Instructional staff, various levels	Total	Public	Nonpublic
Total, all levels	3,069	2,660	409
Elementary	1,317	1,165	152
Secondary	1,098	1,019	79
Higher education	654	476	178

Source: NCES, *Digest of Education Statistics: 1975 Edition* (Washington: Government Printing Office, 1976).

Men comprise an increasing proportion of elementary instructional staff (15 percent in 1970, up from 9 percent in 1950) and women comprise a slowly increasing proportion of instructional staff in institutions of higher education (25 percent in 1970, up from 23 percent in 1950). The slow progress toward parity between men and women on college and university faculties is related to the small proportion of doctorates awarded to women

TABLE 2.5. *Number of students and percentage of total enrollment at various levels of instruction: 1900-70*

Year	Total	Elementary	Secondary	College and university
		Number of students in thousands		
1900	17,199	16,262	699	238
1910	19,999	18,529	1,115	355
1920	24,062	20,964	2,500	598
1930	29,653	23,740	4,812	1,101
1940	29,751	21,127	7,130	1,494
1950	31,319	22,207	6,453	2,659
1960	45,228	32,412	9,600	3,216
1970	58,765	37,111	14,518	7,136
		Percentage of total enrollment		
1900	100.0	94.5	4.1	1.4
1910	100.0	92.6	5.6	1.8
1920	100.0	87.1	10.4	2.5
1930	100.0	80.1	16.2	3.7
1940	100.0	71.0	24.0	5.0
1950	100.0	70.9	20.6	8.5
1960	100.0	71.6	21.2	7.1
1970	100.0	63.2	24.7	12.1

Source: NCES, *Digest of Educational Statistics: 1973 Edition* (Washington: Government Printing Office, 1974).

in earlier years, since the doctorate is expected of most if not all higher education faculty members. In the early 1970's, an enrollment equalization process began in graduate schools, partly as a result of Federal antidiscrimination statutes. By 1973, the number of women who received doctorates was 15.2 percent higher than in the previous year, while the number of men who received doctorates actually declined 0.3 percent.4

The workload of the instructional staff is often measured in terms of students per teacher. Table 2.7 shows that overcrowded classrooms were more of a problem in previous decades than in the early 1970's. At elementary and secondary levels, student-teacher ratios were more favorable in 1970 than in any of the r[illegible] decennial years shown. The student-teac[illegible] in higher education is erratic, rising [illegible] one [illegible] and falling in another; it is presen[illegible] to its 1930 level.

TABLE 2.7. *Students per teacher, by level of instruction: 1930-70*

Year	Elementary	Secondary	College and university
1930	33.8	20.5	13.0
1940	33.0	21.6	12.8
1950	33.4	17.6	14.0
1960	34.0	16.6	11.4
1970	29.0	14.5	12.4

Source: NCES, *Digest of Educational Statistics: 1973 Edition* (Washington: Government Printing Office, 1974).

D. EXPENDITURES FOR EDUCATION

Annual outlays for education in the United States will soon exceed $100 billion. In the early 1970's, expenditures jumped to $80 billion and then to $90 billion (they had been, in contrast, only $45 billion in 1965). While some of the higher expenditure reflects an inflationary period, education's share of the gross national product rose from 5.3 percent in 1960 to 7.7 percent in 1970.

The heaviest burden of expenditure for education rests jointly with State and local governments. The former pay 34 percent and the latter 31 percent of the total. The Federal contribution is 10 percent of the total, and other sources (such as tuition and gifts) provide 25 percent.

Elementary and secondary expenditures per student rose from $520 in 1963 to $1,220 in 1973. College and university expenditures per student rose from $2,670 in 1963 to $4,150 in 1973. Table 2.8 shows that while local sources still constitute the chief source of support for elementary and secondary education, they now provide less than half of the total (46 percent). Conversely, sources other than Federal, State, or local provide 51 percent of the support for higher education; however, State sources are important at all levels.

E. PUBLIC LIBRARIES AND PUBLIC TELEVISION

In addition to adult education classes which enrolled about 16 million adults in 1973, significant community education resources include public libraries and public television. The extent of these resources is shown in Tables 2.9 and 2.10.

Half a century ago, William Learned stated:

> The chief business of a community library is to produce a general diffusion of knowledge among small, ill-defined, and constantly shifting groups, where each need is peculiar to the individual himself and must be dealt with separately.5

Somewhat later, Alvin Johnson added:

> It was never imagined by the early proponents of universal public education that the instruction given by the schools could in itself equip the child or young person with the political and cultural ideas that would be needed in later life.6

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4. National Research Council, *Survey of Earned Doctorates* (Washington: Government Printing Office, 1974).

5. William S. Learned, *The American Public Library and the Diffusion of Knowledge* (New York: Harcourt Brace, 1924), pp. 27-8.

6. Alvin Johnson, *The Public Library: A People's University* (New York: American Association for Adult Education, 1938). p. 65.

TABLE 2.8. *Estimated dollar expenditures for education, by source of funds and level of instruction: 1974-75*

Source of funds	All Levels	Elementary & Secondary	Higher Education
	Billions of Dollars		
Total	**108.7**	**68.5**	**40.2**
Federal	11.6	5.5	6.1
State	36.6	24.8	11.8
Local	33.2	31.4	1.8
All other	27.3	6.8	20.5
	Percentage of expenditure		
Total	**100.0**	**100.0**	**100.0**
Federal	10.7	8.0	15.2
State	33.7	36.2	29.3
Local	30.5	45.9	4.5
All other	25.1	9.9	51.0

Source: N [illegible] *tatistics: 1975 Edition* (Washington: Government Printing Office, 1976).

TABLE 2.9. *Number of U.S. public libraries serving populations of 25,000 or more, and annual circulation by population category: 1968*

Population category	Libraries	Circulation (in thousands)*
Total	1,135	560,215
25,000-34,999	285	48,041
35,000-49,999	271	53,629
50,000-99,999	335	106,965
100,000-499,999	206	195,159
500,000 or more	38	156,421

*Circulation data are lacking for one "average-sized State."

Source: NCES, *Digest of Educational Statistics: 1973 Edition* (Washington: Government Printing Office, 1974).

Extrapolating 1968 data, the 1,200 library systems serving populations of 25,000 or more are presently circulating about 600 million volumes annually. Just the 40 libraries serving populations of 500,000 or more are circulating 160 million volumes annually, or an average of 4 million volumes annually per library.

Public television, although a new community resource in comparison with the public library, has been operating in some locations for [illegible] years.[7] In 1973 there were 221 public television stations; their licenses were assigned in comparable numbers to higher education institutions, State or municipal authorities, and community organizations. About two-thirds of public television's broadcast time is devoted to general audience programing; the rest, to classroom programing.

TABLE 2.10. *Number of public television stations and annual broadcast hours, by types of licensee and programing: 1973*

Licensee and programing	Stations	Broadcast hours
Total	221	809,588
Type of licensee		
College and university	67	225,291
Local public school system	19	57,758
State or munici[illegible] authority	74	299,927
Community [illegible]ation	61	226,612
Type of progra[illegible]		
Classroom	...	260,067
General audi[illegible]	...	549,521

Source: NCES, [illegible]st *of Education Statistics: 1975 Edition* (Wash[illegible]on: Government Printing Office, 1976).

7. W. Schramm et al., *The People Look at Educational Television* (Palo Alto, Calif.: Stanford University Press, 1963).

F. EDUCATIONAL ATTAINMENT

Multiple indicators (see Tables 2.11-2.13) show that there has been a slow but steady increase in the level of educational attainment. The percentage of students entering college has increased nearly four fold in four decades. The percentage of students completing high school is larger in absolute terms but shows less relative growth.

TABLE 2.11. *Literate percentage of the population 14-15 years and older: 1900-70*

Year	Percent
1900	88.7
1930	95.2
1970	99.0

Source: NCES, *Digest of Educational Statistics: 1973 Edition* (Washington: Government Printing Office, 1974).

TABLE 2.12. *Median number of school years completed by persons 25 years old and older: 1910-70*

Year	Number of school years
1910	8.1
1920	8.2
19[illegible]	8.4
19[illegible]	8.6
195[illegible]	9.3
196[illegible]	10.5
197[illegible]	12.2

Source: NCES, *D[illegible]st of [illegible]ucational Statistics: 1973 Edition* (Washi[illegible]ton: [illegible]overnment Printing Office, 1974).

Illiteracy, wh[illegible] 11 percent at the turn of the cen[illegible] to 5 percent by 1930 and 1 percent [illegible].

Median ed[illegible] population 25 years old and over [illegible] nearly 4 grades or years since 1940; [illegible]ent amount of time before 1940, [illegible] grade or year had been gained.

About 4 o[illegible] young people in the United States now e[illegible]r [illegible]secondary education. As a consequence, 1.5 [illegible] college degrees were conferred in 197[illegible] [illegible] Table 2.14.) Ten years earlier, in 1961, the comparable total was 600,000. By 1966 the total had only risen to 800,000.

TABLE 2.13. *Number of students graduating from high school and number entering college as a percentage of the 5th grade class of 7 years earlier: 1932-72*

Year	Percentage graduating high school	Percentage entering college
1932	30.2	11.8
1942	46.7	12.9
1952	52.2	23.4
1962	64.2	34.3
1972	74.8	43.3

Source: NCES, *Digest of Educational Statistics: 1973 Edition* (Washington: Government Printing Office, 1974).

The following details describe the major increase in degrees conferred:

- Associate's degrees, up 161 percent in 1972 from 112,000 in 1966;
- Bachelor's degrees, up 75 percent in 1973 from 527,000 in 1966;
- Master's degrees, up 88 percent in 1973 from 140,000 in 1966;
- Doctor's degrees (Ph.D., Ed.D.) up 93 percent in 1973 from 18,000 in 1966.

Overall improvement in publ[illegible] educational levels can overshadow problems that subgroups are encountering. The National Assessment of Educational Progress (NAEP) provides the most valid indicators available of demographic differences in attainment. It can be seen in Table 2.15 that, whereas sex does not account for strong differences in NAEP performance, both race and parents' educational background do.

The role of education in social mobility is currently in considerable debate. Although there appears to be some positive association, its precise nature is open to question. Demographic differences in attainment among 17-[illegible]olds, who will soon be competing with each [illegible] in the job market, [illegible]dicate that education fails to provide some stu[illegible]ents with skills and resour[illegible] they will later nee[illegible] to "make it."

TABLE 2.14. *Number of degrees earned from colleges and universities, by sex: 1973*

Degrees	Total	Women	Men
Total	1,554,188	648,224	905,964
Academic			
Associate's*	292,119	125,802	166,317
Bachelor's	922,362	404,171	518,191
Master's	263,371	108,903	154,468
Doctor's (Ph.D., Ed.D., etc.)	34,777	6,206	28,571
Professional			
Medical (M.D.)	10,307	919	9,388
Dental (D.D.S., D.M.D.)	4,047	55	3,992
Legal (LL.B., J.D.)	27,205	2,168	25,037

*1972 data.

Source: NCES, *Digest of Education Statistics: 1975 Edition* (Washington: Government Printing Office, 1976).

TABLE 2.15. *Performance of 17-year-olds on the National Assessment of Educational Progress by sex, race, and parents' education, selected years*

Characteristic	Reading 1970-71	Writing 1969-70	Citizenship 1969-70	Science 1969-70
Median percent items correct	77.5	62.5	61.8	47.0
Median percent difference				
Sex				
Male	*–2.0	–3.4	.4	2.9
Female	1.9	3.0	–.4	–2.4
Race				
White	2.2	2.8	1.7	2.0
Black	–16.4	–19.8	–9.8	–11.9
Other	–3.5	–8.2	–6.1	–6.8
Parents' education				
Unknown	–7.9	–11.8	–11.0	–9.1
No high school	–11.1	–10.8	–9.1	–8.4
Some high school	–6.0	–10.7	–3.6	–7.7
High school graduate	– .3	1.2	.3	.1
More than high school	5.6	6.4	5.0	5.0

*For example, males averaged 75.5 percent items correct, which is 2.0 percent lower than the total sample.

Source: NCES, *Digest of Education Statistics: 1976 Edition* (Washington: Government Printing Office, 1976).

CHAPTER 3
SPONSORSHIP AND COORDINATION OF EDUCATION R&D

A. BACKGROUND FACTORS

A Century of Change in Education

Thoughtful, sustained efforts to improve American education date from the 1850's. By 1867, when the forerunner of the U.S. Office of Education was established, Henry Barnard (founder of the *American Journal of Education* and first U.S. Commissioner of Education) and his colleagues were writing of a "science of education" that emphasized collection of statistics on American education and codification of best existing practices.

By the end of the 19th century, the codification of existing practices gave way to an experimental attitude. William James, G. Stanley Hall, John Dewey, and E.L. Thorndike, among others, showed the relevance of psychological research to education. Laboratory schools were established under the aegis of leading colleges of education.

Early years of the 20th century saw the introduction of standardized testing. Student achievement was adopted as the quantifiable criterion of an educational program's success. Then, as now, achievement tests were vulnerable to abuse, such as "teaching for the test;" but the neutrality of the tests invited comparison of different instructional approaches, materials, staff arrangements, and other variables.

By the end of the 1930's, sweeping changes could be seen in the schools:

> . . .wholly new curriculum, with an elective system that spanned dozens of school subjects; a range of instructional methods that embraced laboratories, field trips, visual aids, school libraries; consolidated high schools offering vocational as well as academic curriculums; vocational guidance programs and diagnostic services directed by school psychologists; school buildings designed for educational efficiency and built to high standards; and enormous advances in the preparation, style of work, and salaries of teachers.[1]

Among its many other effects on [illegible] World War II inspired a belief in technological solutions to national problems. Since "American know-how" was instrumental in winning the war and reconstructing Europe and Japan, it seemed that educational problems could be solved by the same know-how. In the postwar period, new school-industry alliances were formed. Industrial solutions to education problems took the form of audiovisual equipment, language laboratories, ITFS (Instructional Television Fixed Service) systems, and the highly publicized teaching machines. Many of the new curriculum materials were developed according to procedures that industry had learned in defense work. During the 1950's and 1960's educational reform relied heavily upon these technological approaches. As the limitations and shortcomings of these approaches became clear during actual use, attention returned to technological approaches to improve educational practice.

A significant factor in postwar educational knowledge production and utilization was Federal funding. (A brief discussion of this period appears in Section 3.C.)

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1. Office of Education, *Educational Research and Development in the United States* (Washington: Government Printing Office, 1969), p. 41.

The Knowledge Society and the Emergence of "Big Science"

Major changes in our society and economy have been described in terms of emergence of "post-industrial society"[2] and the dominance of "knowledge industries."[3] Aspects of the shift to the "knowledge economy" have been summarized by Peter Drucker:

> The "knowledge industries," which produce and distribute ideas and information rather than goods and services, accounted in 1955 for one-quarter of the U.S. gross national product. This was already three times the proportion of the national product that the country had spent on the 'knowledge sector' in 1900. Yet by 1965, ten years later, the knowledge sector was taking one-third of a much bigger product. In the late 1970's it will account for one-half of the total national product. Every other dollar earned and spent in the American economy will be earned by producing and distributing ideas and information, and will be spent on procuring ideas and information.
>
> From an economy of goods, which America was as recently as World War II, we have changed into a knowledge economy. . . .Thirty years ago, on the eve of World War II, semi-skilled machine operators, the men on the assembly line, were the center of the American work force. Today the center is the knowledge worker, the man or woman who applies to productive work ideas, concepts, and information rather than manual skill or brawn. Our largest single occupation is teaching—that is, the systematic supply of knowledge and systematic training in applying it.[4]

Important aspects of these changes in society have been the increased use of scientific knowledge to solve practical problems and new ways of organizing scientific and technological activities. We are now in the fourth decade of what Derek Price[5] calls "big science." The prewar model of small-scale individual research yielded to large-scale organized research with teams of scientists, specialization, and the division of labor. The new period signaled a different approach to such things as control of the environment, production, provision of services, and social planning. The application of R&D to education problems can be viewed as part of this larger trend, although it remains to be seen whether somewhat different models are needed in applying scientific knowledge to social problems.

B. OVERVIEW OF SPONSORSHIP

Sponsorship [illegible], in particular, of education R&D is difficult to assess accurately. There are many problems including definition, completeness, access, level of aggregation, and the occasional absence of a needed data series. The *Databook Technical Report*[6] discusses problems associated with the numerous data series referenced in this book.

Sponsorship of All R&D

Evidence of the growth of R&D in the past four decades appears in sponsorship data. In 1941, a total of $900 million was expended from all sources for R&D in the United States. Industry contributed 57 percent of this amount and consumed 73 percent. Government (at all levels) contributed 41 percent and consumed 22 percent. Colleges and universities contributed 2 percent and consumed 4 percent.[7]

After World War II, the Federal Government successively undertook R&D sponsorship of a growing number of fields. Final passage of the National Science Foundation legislation in 1950, after years of congressional debate and a Presidential veto, brought Federal support to physics, chemistry, geology, and other "hard" sciences. In the 1950's, the life sciences and biomedicine were

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2. Daniel Bell, *The Coming of Post-Industrial Society: A Venture in Social Forecasting* (New York: Basic Books, 1973).

3. Fritz Machlup, *The Production and Distribution of Knowledge in the United States* (Princeton, N.J.: Princeton University Press, 1962).

4. Peter F. Drucker, *The Age of Discontinuity: Guidelines to our Changing Society* (New York: Harper & Row, 1969), p. 263.

5. Derek Price, *Little Science, Big Science* (New York: Columbia University Press, 1963).

6. Karen Shapiro, Matilda Butler, William Paisley, *Monitoring the Status of Educational Research and Development in the United States: Technical Report to Accompany 1975 Databook* (Stanford, California: Stanford University, Institute for Communication Research, 1976).

7. Machlup, *The Production and Distribution of Knowledge.*

the focus of a series of R&D authorizations assigned to the National Institutes of Health. As the "Great Society" programs emerged in the 1960's, social research received new Federal emphasis.

In 1970, the latest year for which fully comparable data are available, more than $26 billion was expended from all sources for R&D. Government is now the largest sponsor, contributing 56 percent and consuming 15 percent. Industry is second in contribution but first in consumption, with 39 percent and 68 percent, respectively. Colleges, universities, and other nonprofit organizations contribute 5 percent and consume 17 percent. Table 3.1 shows the pattern of transfers of funds from contributors (sponsors) to consumers (performers).

Before the increase in R&D expenditure from $900 million in 1941 to $26 billion in 1970 can be interpreted, allowance must be made for inflation—that is, for the decreasing amount of R&D that a dollar buys. Chapter 2 noted that an apparent doubling of expenditures for education during the 1960's represented a smaller increase (45 percent) of education's share of the gross national product (GNP). Table 3.2 shows that, whereas the $900 million R&D expenditure in 1941 was roughly 0.3 percent of the GNP, the $26 billion R&D expenditure in 1970 was 2.7 percent of the GNP. The parallel display of education's share of the GNP clarifies the general relationship of growth in the two expenditure categories. Time series data on education R&D funding as a percentage of the GNP are lacking. Estimates developed in this chapter indicate that education R&D funding may now be .05 percent of the GNP.

TABLE 3.2. *Expenditures on education and on all R&D as a percentage of the GNP: 1930-70*

Year	GNP (billions)	Education (% of GNP)	All R&D (% of GNP)
1930	90.3	3.8	.2
1940	99.6	3.0	.3
1950	284.7	3.4	1.0
1960	503.7	5.3	2.7
1970	977.1	7.7	2.7

Source: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States* (Washington: Government Printing Office, 1[illegible]).

Sponsorship of Education R&D

It is impossible to state the precise total spent on education R&D in the United States. Analysis is hampered by a lack of data series needed for such an estimate, conceptual incompatibilities in the definitions of existing series (e.g., the inclusion of training/manpower development, or science information systems), and differences in the range of functions recognized (e.g., "routine" data gathering and testing; research training). Such ambiguities are compounded by differing reporting procedures. The lack of data for some support sources such as industry and local governmental bodies requires the use of highly conjectural figures. Accordingly, the following figures must be considered to be approximations.

The National Science Foundation (NSF) presents one estimate of Federal sponsorship which is confined to R&D functions and relies on program level data from a limited number of agencies. The amount shown for FY 1975 is $158 million. For the same year, the Office of Management and Budget (OMB) reports $430 million. OMB used somewhat different definitions for both

TABLE 3.1. *Transfers of funds for all R&D: 1970*
(In millions of dollars)

Transfer from:	Total	Transfer to: Federal Government	Industry	College and university	Other nonprofit
Total	**26,287**	**3,876**	**17,858**	**3,593**	**960**
Federal Government	14,705	3,876	7,784	2,395	650
Industry	10,226	. . .	10,074	62	90
College and university	970	. . .	. . .	970	. . .
Other nonprofit	386	. . .	. . .	166	220

Source: NSF, *National Patterns of R&D Resources, Funds, and Manpower in the United States, 1953-1973* (Washington: Government Printing Office, 1974).

education and R&D functions covered, and reported on more agencies. A preliminary analysis of programs not covered by NSF and OMB and using project data raised the figure to $506 million.

Because of difficulties involved in merging project and program est[illegible] the limitations discussed earlier, it [illegible] to determine a most likely figure a[illegible] and lower limits could be placed. This mo[illegible] li[illegible] figure for Federal sponsorship in FY 1975 is $470 million, with a lower bound of $430 million and an upper limit of $520 million.

Funds provided by non-Federal support sources are even less well documented. The only source of information for State and local funding is the NSF, whose data exclude dissemination and utilization activities. The 1975 figures must be extrapolated from time series with few measurement points, the last of which is several years old for each series: 1973 for State government data, and 1969 for local governmental bodies. A likely figure of State funds is $40 million ($30 to $60 million); of local government funds, $4 million ($2 to $10 million). These represent estimates of funds without flow-through monies.

Among the private sector sources, only foundation funds can be stated with reasonable confidence. An estimate of $57 million ($57 to $65 million) is based on project funds allocated to education R&D in FY 1974 by more than 100 foundations that support such work. No data exist for independent funding activities of private nonprofit associations or for education R&D in the private sector. A likely estimate of $5 million ($3 to $25 million) is highly uncertain. Total national funds spent on education R&D in FY 1975 are, by this method, $576 million ($504 to $665 million).

C. FEDERAL FUNDING

History of Federal Education R&D Programs

The origins and growth of Federal involvement in education R&D have been described by Gideonse[8] and Clark[9]. In *Educational Research and Development in the United States*, Gideonse examined its history beginning with the establishment of the U.S. Office of Education (OE) in 1867. In *Federal Policy in Educational Research*, Clark discusses the major policy changes starting shortly before the Cooperative Research Act was passed in [illegible]954. Information reflecting the present status [illegible]deral programs [illegible]may be useful if perspecti[illegible] [illegible] legislati[illegible] and [illegible]ganization of Federal [illegible]hip are given for the period of greatest growth (1963-71) and the period of program modification and restructuring (1972-75).

Growth Period (1963-71). Federal legislation authorizing and funding R&D activities, particularly those directly related to public schools, was limited until 1963. The Hatch Act of 1897 helped support the schools and departments of education in land grant colleges and encouraged their involvement in R&D. The Cooperative Research Act of 1954 authorized R&D support to various projects in universities and educational agencies. The National Defense Education Act of 1958 encouraged development of language studies, among other activities. The National Science Foundation Act of 1950 was the source of NSF's science curriculum improvement studies which began in the midfifties. NSF's leadership in curriculum reform stimulated OE to initiate Project Social Studies and English within the existing authority of the Cooperative Research Act.

Most of the legislation currently mandating Federal education R&D originated between 1963 and 1967. Within OE, the Vocational Education Act and the Mental Retardation Facilities and Community Mental Health Centers Construction Act of 1963 established a basis for funding R&D activities in vocational education and education for the handicapped.

Vocational education. Responsibility for R&D in vocational education has shifted among several different offices in OE. Vocational research activities were centralized in late 1965 in the Bureau of Research, later named the National Center for Educational Research and Development (NCERD). The Vocational Education Amendments of 1968 left research responsibility for vocational education within the NCERD while placing curriculum development and demonstration activities within the new Division of Vocational and Technical Education. The development of Career Education Models in 1970 proceeded with the agreement that NCERD would initiate evaluations while the Division of Vocational and Technical Education

8. OE, *Educational R&D in U.S.* (1969).

9. David L. Clark, *Federal Policy in Educational Research* (Bloomington: Indiana University Research Foundation, 1974).

would have responsibility for demonstrations and replications. This shared support system ended when research in vocational education was transferred to a new Division of Research and Demonstration in the Bureau of Occupational and Adult Education.

Education for the handicapped. R&D in education for the handicapped was first supported by the Bureau of Research until the creation in 1967 of the Bureau of Education for the Handicapped. The new Bureau's Division of Research (now the Division of Innovation and Development) continued funding for projects and initiated institutional support for Research and Demonstration Centers. The Education of the Handicapped Act of 1970 extended the scope of activities to include support of demonstrations, dissemination, and evaluation. Capacity for performing R&D activity was increased through contracting with the National Center on Educational Media and Materials for the Handicapped and supporting research and demonstration activities in regional centers.

Higher Education. Federal support for colleges and universities following World War II resulted mainly from academic research, research training, and programs such as the GI bill of rights. This support led to significant but unfocused change in higher education. NSF's Science Improvement program began the move toward focused change, culminating in 1965 in the Higher Education Act, administered by OE. The Higher Education Act established new Federal leadership for innovation and reform in postsecondary education. Among programs authorized by the new legislation were research and innovation in library sciences (title II), support for strengthening new institutions (title III), and improvement in undergraduate instruction (title IV).

Teacher training. A major new emphasis during the 1963-71 period was on reform and stimulus of teacher training. In 1965, the Elementary and Secondary Education Act (ESEA) and the Equal Opportunity Act placed training priorities in such critical areas as preschool, disadvantaged, bilingual, handicapped, educational media, remedial reading, and speech. Both of these acts had considerable impact not only on the primary objective of opportunity for the economically disadvantaged but also on the increased Federal support of innovation and research for all populations.

In 1967, the Education Professions Development Act supported design, development, and evaluation of undergraduate teacher training programs. This act also established the Teacher Corps and encouraged the training and use of paraprofessionals in public schools.

ESEA. The ESEA had altered the status quo of school systems through titles I (financial assistance for education of children from low income families), II, and III. Federal policymakers had envisioned that the primary impetus for innovation in schools would be titles III and IV. Title III established new mechanisms for delivering services previously unavailable to individual schools. It was conceived as a means of linking R&D with practice through such mechanisms as Supplementary Centers. These Centers were to be the focal point for delivering innovative services to individual schools. Actually, title III funds have been used to support development and dissemination of "exemplary" practice.

Title IV of the ESEA amended the Cooperative Research Act in major ways. It authorized the Commissioner of Education to support not only research but also surveys, demonstrations, and the dissemination of information derived from educational research. It authorized support for the training of researchers, and for constructing and equipping educational research facilities. Furthermore, eligibility requirements to receive funds were expanded to include virtually any kind of organization, institution, or agency except Federal agencies. In line with this expanded scope, funding authorizations were increased substantially and matched with larger appropriations. Most importantly, title IV established laboratories and education policy centers, created the Educational Resources Information Center (ERIC) and its clearinghouses, and expanded support for the R&D centers originally established in 1964-65.

OEO programs. The preceding history covers major legislative acts relating to OE which stimulated growth in R&D activity. Other Federal agencies received new mandates that would shape the future direction of education.

The Equal Opportunity Act of 1965 ambitiously initiated a number of innovative and experimental programs with comprehensive social objectives. While title I of ESEA, administered by OE, sought to augment existing school programs, the new Office of Economic Opportunity (OEO) developed alternative education activities largely outside school settings.

Head Start, Follow Through, and Upward Bound programs had similar goals to increase the ability of children and youth from low-income families to compete with others at the entry points for elementary and postsecondary education. Together, these programs sponsored "compensatory" activities. The Job Corps was created to develop alternatives for adolescents unable to complete conventional, compulsory secondary education programs.

OEO became one of the first agencies to sponsor large-scale evaluations of its social interventions, a procedure now considered mandatory in most Federal education programs. OEO's Division of Research, Plans, Programs, and Evaluation also initiated the Educational Voucher Program and the Performance Contracting Program. These programs challenged existing methods of finance and administration in education.

OEO's strategy of compensatory early childhood education programs recognized that children from low-income families and children with learning disabilities frequently arrived at schools considerably behind their peers. The Federal Government recognized that research was necessary to determine what factors created these conditions.

Beginning in 1970, OEO educational programs were transferred to other agencies which had research mandates. Head Start was transferred to the Office of Child Development which had been created by Executive Order in 1969. Follow Through and Upward Bound were transferred to OE. The Job Corps program was transferred to the Manpower Administration of the Department of Labor. When the performance contract experiment concluded and the Voucher Program was transferred to NIE in 1972, OEO's direct involvement in educational R&D ended.

Other agencies. While OEO was losing its R&D responsibility, other agencies were increasing their activity. The National Foundation for the Arts and Humanities and the Appalachian Regional Development Commission were created in 1965. In very different ways, both agencies began promotion of education R&D activities as an integral means of accomplishing their missions. The former, through the use of Federal matching funds, encourages private contributions and support for programs which stimulate development in the arts and humanities. The latter established a partnership with State regional members to promote economic and social development in the areas designated in the legislation.

Increased Federal support for behavioral, social, and biological science research contributed to the expansion of education R&D during the 1963-71 period. The National Institute of Mental Health, NSF, and the National Institute of Neurological and Communicative Disorders and Stroke received increased research funding. Together with the Department of Defense (where funding was maintained without being increased substantially), these agencies had been the major sources supporting research investigating biological, nutritional, and environmental conditions affecting learning, motivation, cognitive development, and socialization. In recent years, this research has become an important aspect of education R&D.

Modification and Restructuring Period (1972-75). The period of new legislation and expansion of Federal involvement and support in education R&D (1963-69) was followed by only a short span of operational stability. In 1972 a new period of legislative activity was marked by reorganization, reauthorization, and reconstruction of educational priorities and programs.

The Emergency School Aid Act was passed in 1972 along with other legislation affecting education somewhat less directly (e.g., the Rural Development Act of 1972 and the National Research Act of 1974). The Education Amendments of 1972 and 1974 and the Equal Opportunity Act Amendments of 1972 recast the programs and administration of the three major acts of the previous decade which authorized educational R&D activity (the Higher Education Act, the ESEA and the Equal Opportunity Act of 1965).

These amendments established the HEW Education Division, the National Institute of Education (NIE), and the Fund for the Improvement of Post-Secondary Education. They transferred the National Center for Educational Statistics (NCES) from OE to the Department of Health, Education, and Welfare's (HEW) Office of the Assistant Secretary for Education. And they tacitly approved transfers of Head Start and Follow Through programs from OEO to OE and to the

Office of Human Development. Internal reorganization of OE was stimulated by clusters of new priorities and programs mandated by various titles of the legislative amendments. These clusters included the following programs: Indian Education; Bilingual Education; Special Projects; National Reading Improvement; and Ethnic Heritage.

The 1972 Education Amendments. The Education Amendments of 1972 were the culmination of several years of bipartisan effort to establish a separate organization within HEW devoted exclusively to education R&D. The issue of central management and coordination of R&D programs within OE was never fully resolved. Despite frequent organizational changes during 1963-68, a lack of unity prevailed. The R&D community perceived this to be a major cause of the leveling-off of Federal support for the new education R&D programs. Researchers and practitioners believed funding levels to be insufficient to meet program goals and expectations. When debate within the R&D community reached the members of the President's Science Advisory Board, the stage was set for new legislative initiatives.

The original legislative proposal for a national institute of education was introduced in January 1971. Although legislation was not passed until the following year, an NIE Planning Unit was created under the auspices of OE and HEW's Office of Planning and Evaluation. This 1-year delay mingled NIE's legislative history with debate concerning reorganization in education. The debate concerned the extension of the Vocational Education Act of 1963, establishment of a National Foundation for Post-Secondary Education, major proposals for consolidation of certain discretionary elementary and secondary categorical programs under "Educational Renewal," and creation of a Bureau of Indian Education in OE.

Emerging from the debate on these issues was a basic restructuring of authority for national education programs in HEW. The 1972 amendments authorized immediate establishment of an Education Division. An Assistant Secretary of Education was named to preside over NIE and OE and directly supervise the Fund for the Improvement of Post-Secondary Education (a compromise after failing to establish a separate Foundation for Post-Secondary Education). Defeat of the "Educational Renewal" proposal was accompanied by extension of the Cooperative Research Act (as amended by title IV of ESEA) that had been the basis of much OE R&D activity prior to establishment of NIE. By continuing the authorization of Cooperative Research Act activities, the Education Division had time to determine appropriate roles for NIE and OE.

OE kept responsibility for R&D in handicapped and vocational education and support of the two Education Policy Centers. NIE became responsible for ongoing activities of the National Centers for Educational Research and Development (NCERD) and Educational Communications (NCEC), the Experimental Schools Program, and selected projects in educational technology including the Educational Satellite Program.

The 1974 Education Amendments. The Education Amendments of 1974 extensively revised many of the activities authorized by the ESEA of 1965. Special attention was given to improving bilingual, handicapped, and adult education programs. A national Reading Improvement Program was initiated. A new State grants program stimulating development and demonstration of "exemplary" programs in nutrition and health and a special projects program for experimentation with new methods, techniques, and practices were among the new R&D activities specified for OE (replacing title IV as extended in the 1972 amendments). Several "national priorities" were specified in the act. They include use of the metric system, education of gifted and talented children, community schools, career education, consumer education, women's equity in education, and use of the arts in education.

The 1974 amendments also commissioned the HEW Education Division to conduct selected policy studies and surveys. NIE was mandated to conduct a 3-year study of compensatory education and a 2-year study of school safety. Scattered throughout the act were activities to be conducted by the National Center for Educational Statistics, which achieved new stature by its mandated transfer from OE to the Office of the Assistant Secretary of Education.

Other legislation. The reform of OE programs by the 1972 and 1974 Education Amendments overshadowed, but did not reduce, the importance of other Federal legislation and funding changes taking place. For example, the Emergency School

Aid Act of 1972 was designed to alleviate costs of school systems desegregating under court order, but the act was administered in a way that promoted innovation in the use of educational television as well as other practices.

The Rural Development Act of 1972 specified support for R&D activities at land grant colleges and universities for the purpose of improving the quality of economic and social life of rural communities.

The National Research Act of 1974 consolidated research training programs in all Public Health Service agencies for the behavioral and biological sciences.

The Crime Control Act of 1973 increased support to the National Institute of Law Enforcement and Criminal Justice in the Law Enforcement Assistance Administration of the Justice Department for social R&D activities including school aspects.

And the Comprehensive Employment and Training Act of 1973 authorized a comprehensive program of R&D in manpower development in the Department of Labor with a focus on basic education and skill training for youth, criminal offenders, and unemployed adults.

These acts have established multiple sources for the funding of education R&D. In 1975, these agencies spent as little as $157.8 million according to the NSF perspective or as much as $429.8 million according to the OMB perspective. Discussion of these perspectives follows.

Estimates of Federal Funding of Education R&D

Estimates of total Federal funding of education R&D vary considerably according to data collection procedures. There are four key differences:

Definition of terms. How is "education" defined, and how is it differentiated from "manpower development?"

Range of function included. Is "R&D" analyzed in its narrower or broader usages? In the narrower usage, is all basic research of relevance to education included? In the broader usage, are dissemination and utilization programs included?

Agencies and programs included. Several Federal agencies sponsor education R&D although it is secondary to other missions (e.g., health care, child development). Are education R&D programs of these agencies identified?

Level of data aggregation. Are education R&D projects identified within general programs?

Two well established statistical series reporting data on Federal funding of all R&D are the *Analysis of Federal Funding by Function*, published by the Division of Science Resource Studies of NSF, and the *Special Analyses of the President's Budget*, prepared as a supplement to each annual budget by OMB. They differ in their estimate of Federal funding of education R&D because of the foregoing and other points.

The point of view adopted in the *Databook*, which is similar to that used by Gideonse in chapter VII of the NCERD's report, is that neither the NSF nor the OMB statistical series covers the entire range of relevant activity. However, each statistical series is useful for certain purposes, and it is important to understand the NSF and OMB perspectives as they contribute to NIE's composite view.

NSF Perspective. Although NSF has published Federal R&D funding data since 1952, it has only recently begun to compile and analyze these data for education as a separate category. The first published NSF analysis[11] of education covered the period 1963-73 but included data on education R&D programs only for agencies in which education was a primary mission. NSF expanded its coverage of education in its next analysis[12] to include all activities that were primarily education R&D regardless of the parent agency's mission, but it did not readjust data for years prior to 1969.

Table 3.3 reports NSF's estimate of total funding of education R&D for the Fiscal Years 1969 to 1975 according to its fifth functional analysis.[13]

The interpretation of NSF's total estimate is affected by three factors:

In the NSF taxonomy, education is a function parallel to 13 other functions. The 13 others

10. OE, *Educational R&D in U.S.* (1969).

11. National Science Foundation, *An Analysis of Federal R&D Funding by Function* (Washington: Government Printing Office, 1971).

12. Ibid. (1972).

13. Ibid. (1975).

TABLE 3.3. *NSF perspective of Federal obligations for education R&D: FY 1969 – FY 1975**
(In millions of dollars)

Agency and Program	1969	1970	1971	1972	1973	1974	1975*
Total	**154.8**	**146.6**	**186.1**	**190.7**	**214.2**	**173.5**	**157.8**
Percent change from previous year	...	*-5.3*	*26.9*	*2.5*	*12.3*	*-19.0*	*-9.1*
National Institute of Education	(84.1)	(78.4)	(75.6)	(64.2)	(118.4)	(75.7)	(70.4)
Institute funding	...	...	...	...	106.8	75.7	70.4
Transfers from OEO**	84.1	78.4	75.6	***64.2	5.2	...	...
Transfers from OEO***	...	...	...	...	6.4	...	...
Office of Education	(18.0)	(18.1)	(68.5)	(72.1)	(58.4)	(51.6)	(46.9)
Vocational education†	...	.9	53.5	56.6	43.1	40.3	35.7
Handicapped education	15.5	15.3	14.2	14.3	13.7	9.9	9.7
Other education programs	2.5	1.9	.8	1.2	1.6	1.4	1.5
Office of Human Development Head Start	4.4	4.5	7.5	4.7	14.2	6.7	6.3
National Science Foundation	(36.4)	(35.6)	(18.4)	(31.9)	(19.3)	(35.9)	(30.2)
Institutional improvement of science	24.3	24.6	9.6	12.4	4.0	2.9	...
Science education improvement	12.1	11.0	8.8	19.5	15.3	33.0	30.2
National Institutes of Health Health Resources Development	11.9	10.1	16.3	17.8	4.0	3.6	4.2

*FY 1969 – FY 1974 figures are actual obligations; FY 1975 figures are estimates based on the President's budget request.

**Funding reflects most projects monitored by the National Center for Educational Research and Development and the National Center for Educational Communications; all projects of the Experimental Schools Program; and some projects of the National Center for Educational Technology and the Bureau of Education for the Handicapped.

***NSF does not show funding for the OEO Voucher Demonstration before FY 1973 ($0.2 in FY 1970; $0.4 in FY 1971; $3.5 in FY 1972).

†Does not reflect $19.9 in Career Education R&D projects transferred to NIE but reported under Vocational Education by NSF in FY 1972.

NOTE.–Figures may not add to totals because of rounding.

Source: NSF, *An Analysis of Federal R&D Funding by Function* (Washington: Government Printing Office, 1975).

are expanded into 40 subfunctions, but education has no subfunctions. Thus activities outside the primary education R&D programs are more likely to be overlooked.

Data are reported to NSF by agencies in response to an annual questionnaire, sometimes resulting in functional category shifts in accord with new agency priorities without significant modification of program content.

NSF definitions of R&D, developed primarily for physical and biological science, tend to exclude dissemination and utilization activities.

The NSF perspective is most useful in tracking growth of "core" R&D funding in agencies whose primary mission is education. It is particularly useful in tracking growth of R&D funding from 1963 to 1968 in OE, which by NSF definition was the only agency supporting education R&D during that period. OE's 1963 R&D funding of $9.6 million doubled in 2 years to $19.4 million in 1965, then nearly doubled in each of the next 2 years (to $37.5 million in 1966 and $70.0 million in 1967). OE's R&D funding began to stabilize thereafter (e.g., $86.8 million in 1969), but annual growth continued to exceed OE's total R&D funding of 5 years earlier.

OMB Perspective. A different view of Federal funding is provided by the *Special Analyses of the Budget of the United States Government,* one of four volumes OMB produces annually for transmittal to Congress by the President each January. The report is a form of program budgeting and is organized to highlight the fiscal impact of all programs in executive departments and agencies in selected functional areas. Under the heading "Federal social programs," a special analysis of education[14] is provided. Comparisons are normally made for a 3-year period: past year, current year, and proposed budget year.

The structure of the OMB analysis permits the multiple classification of programs, with a distinction made between primary and secondary goals. The published special analysis of education includes all programs having education as a primary goal, but unpublished data also permit the identification of programs having secondary goals in education, and these have been included in Table 3.4.

A second way in which the OMB analysis represents an expansion of the NSF approach is that a wider range of activities is included in the definition. Not only is R&D (narrowly defined) included but also experimental and demonstration projects, dissemination of education R&D results, and evaluation of program effectiveness.

As shown in Table 3.4, these differences in perspective result in a sizable increase in the estimates of Federal funding. The OMB estimate is $240.7 million higher in 1974 and $272.0 million higher in 1975. Among the agencies appearing in both analyses, differences are slight, with the one major exception of OE. The broader array of activities included in the OMB definition results in very much larger estimates for OE ($169.3 million higher in 1974 and $171.4 million higher in 1975). Increases attributable to inclusion of a larger number of programs and agencies in the OMB analysis amount to $70.0 million in 1974 and $97.7 million in 1975.

NIE Perspective. Both NSF and OMB use aggregate agency or program data. Project level data can be used to refine these estimates in three ways.[15] First, education R&D projects in agencies and programs not included in the NSF or OMB analyses can be identified. Second, overestimates in the aggregate data can be adjusted. Third, activities reflecting a broader definition of R&D, such as evaluation, can be identified and included.

The analysis of program data alone may fail to include relevant activities because descriptions in

14. OMB's *Special Analysis of Education* uses a broad concept of education R&D, similar to that used throughout the *Databook*. However, OMB's *Special Analysis of Research and Development* defines R&D consistent with the narrower definition used by NSF.

15. NIE has used two project data banks: the Smithsonian Science Information Exchange (SSIE); and the Interagency Research Information Service (IRIS) supported by the Interagency Panels for Research and Development on Early Childhood and Adolescence.

TABLE 3.4. *OMB perspective of Federal obligations for education R&D: 1974-76*
(In millions of dollars)

Agency	1974*	1975**	1976***
Total	**414.2**	**429.8**	**552.6**
Programs with primary education goals	(402.7)	(414.0)	(537.0)
Office of Education	220.9	218.3	342.8
National Institute of Education	75.7	69.9	70.0
National Science Foundation	35.0	31.3	28.6
Assistant Secretary for Education	10.0	11.5	11.5
Assistant Secretary for Human Development	9.0	9.0	9.0
National Endowment for Humanities	51.0	73.2	74.3
Gallaudet College	1.0	.7	.7
Department of the Interior	.1	.1	.1
Programs with secondary education goals	(11.5)	(15.8)	(15.6)
Public Health Service			
National Cancer Institute	.0	2.5	2.9
Health Resources Administration	3.6	3.6	3.6
Appalachian Regional Commission	2.0	1.8	1.5
Department of State	3.0	5.0	5.0
Department of Justice	2.8	2.7	2.4
Department of Treasury	.1	.2	.2

*1974 figures are actual obligations.

**1975 and 1976 figures are obligation estimates.

NOTE.–Figures may not add to totals because of rounding.

Source: OMB, unpublished data on *outlays* for programs with secondary education goals. All data were converted from outlays to obligations by the respective agencies.

broad budget narratives and justifications may overlook education R&D existing as a sub-activity. Furthermore, classification of program-level data under primary national goals rather than program content obscures those R&D activities relevant to education which may have other primary purposes.

Table 3.5 reveals that an additional $76 million in Federal support can be identified from project data. This is a conservative estimate since it does not include estimates for all agencies and programs where such support is thought to exist but remains unavailable. Adding this amount to OMB's estimate of $430 million would total $506 million. However, downward adjustments are also necessary. Some program totals reported by OMB tend to overestimate the amount of support for education R&D. When a program has been identified as having its primary mission in education, its noneducation components may also be included; project level data permit a more refined classification.

In the case of Gideonse's 1969 analysis,[16] in which all OE project data were available to the analysts, the program total of $102 million reported to NSF was $2.1 million higher than that aggregated from project data. The tendency to overestimate obligations by using program budget categories rather than project level data is more acute in programs that have broad, diffuse goals, only one of which may be education.

Taking all adjustments into account, NIE estimates that Federal support for education R&D in fiscal year 1975 was between $430 million and $520 million, with $470 million as the most likely estimate.

TABLE 3.5. *Estimated obligations for education R&D not included in the NSF and OMB perspectives: 1975*
(In millions of dollars)

Agency	Obligations
Total	76.0
Department of Health, Education, and Welfare	
Office of Education	
Office of Planning, Budgeting, and Evaluation	4.6
National Institute of Education	
Interagency transfers*	5.7
National Center for Education Statistics	6.0
Assistant Secretary for Planning and Evaluation	.5
Office of Human Development	
Office of Child Development	5.3
Office of Youth Development	.3
Rehabilitative Services Administration	1.0
Public Health Service	
Alcohol, Drug Abuse, and Mental Health Administration	13.0
Health Resources Administration	
National Center for Health Services Research	1.2
National Institutes of Health	
National Institute of Child Health and Development	4.7
National Institute of Communicative Disorders and Stroke	1.0
National Library of Medicine	.8
Other than Department of Health, Education, and Welfare	
National Endowment of the Arts	4.6
U.S. Commission on Civil Rights	5.4
Department of Agriculture	
Cooperative State Research	10.0
Department of Labor	
Manpower Administration	1.0
Department of Defense	10.9

*Interagency transfers are from OE, National Center for Education Statistics, Office of the Secretary, and Department of Labor.

Source: NIE, data developed from Social Research Group and Smithsonian Science Information Exchange project level data.

16. OE, *Educational R&D in U.S.* (1969).

R&D Support Programs of Selected Federal Agencies

National Institute of Education (NIE). The Education Amendments Act of 1972 established NIE with a mandate to

> Help to solve or to alleviate the problems of, and promote the reform and renewal of, American education;
> Advance the practice of education as an art, science, and profession;
> Strengthen the scientific and technological foundations of education; and
> Build an effective education R&D system.

Within this legislative framework, NIE supports a number of programs in specific priority areas, all of which aim toward improving equality of educational opportunity. NIE's FY 1976 obligations for support of R&D are $70 million.

NIE policy is set by the National Council of Educational Research (NCER), a panel of citizens appointed by the President and confirmed by the Senate. In January 1975 the Council adopted a policy establishing program priorities for NIE in 1976. This policy defined general strategies and program plans which bear the strongest possible relationship to needs identified by the Congress, educators, researchers, State and local policymakers, and others concerned with American education. These priorities have now been written into the legislation reauthorizing the agency.

Funding categories. Table 3.6 shows how resources were allocated to these priority areas from 1973 to 1976. Five categories of NIE R&D funding are summarized in the Budget of the United States for Fiscal 1976:[17]

> *Dissemination.* This program provides information about the results of education R&D. Grants and contracts are made with State education agencies and other agencies to support the hiring of specialists, the training of education personnel, and to support other efforts to assure that such results can be implemented in the classroom.

17. Office of Management and Budget, *Budget of the United States for Fiscal Year 1976: President's Budget Request, Justification for Appropriation Estimates* (Washington: Government Printing Office, 1975).

TABLE 3.6. *NIE obligations and budget estimates, by program activity: FY 1973 – FY 1976*
(In millions of dollars)

Program	Actual 1973	Actual 1974	Actual 1975	Estimated 1976
Total	**106.8**	**75.7**	***70.4**	**70.0**
Dissemination	6.0	6.0	5.9	9.1
Basic skills	19.3	12.5	12.4	15.7
Finance, productivity, and management	38.5	16.6	18.5	17.3
Equity	4.4	4.5	3.0	5.0
Education and work	18.0	14.0	12.7	11.7
Other projects not classified)	14.1	11.1	6.2	.0
Administrative expenses and intramural research	6.5	11.0	11.7	11.2

*Total does not include transfers of $5 million for Compensatory Education Study and $0.75 million for School Safety Study.

Source: NIE

> *Basic Skills.* Research is being conducted to discover what reading and mathematical skills are required for adequate functioning in society, how children may overcome barriers to learning such skills, and how to improve the teaching of reading and mathematics.
>
> *Finance, Productivity, and Management.* Grants and contracts support studies related to the raising and allocation of funds for education, the more efficient use of educational resources, education based on skills or "performance" rather than traditional hours spent in the classroom, the use of technology in education, and other problems such as declining enrollments and improving organization and management.
>
> *Educational Equity.* Equality of educational opportunity is denied many students because of their language or ethnic background, sex, or economic status. Grants and contracts support projects such as improving teacher practices and curricular materials for culturally and linguistically different students, and determining how educational programs for high school students can be made sensitive to cultural-linguistic differences in style of learning and expression.
>
> *Education and Work.* Programs are being supported to provide students with the knowledge, information, and skills required to choose and pursue a career. Special emphasis is placed upon providing work experiences as well as improving

guidance, [illegible] placement activities for youth at the [illegible] level.

A detailed [illegible] of the groups and divisions now [illegible] NIE is presented as Appendix [illegible] The organizational structure and [illegible] (as shown in Table 3.6, [illegible] NIE's priorities) differ slightly. The [illegible] School Capacity for Problem-S[illegible] included in the budget/priority [illegible] finance, productivity, and man[illegible] [illegible] 1976, the obligations of the R&D [illegible] Support Division are included in the "Other projects" category for budget purposes, [illegible] division of the Dissemination and Resources Group in the organization plan.

Funding trends. [illegible]-76 trends are apparent in Table 3.[illegible] [illegible] in funding in 1974 and 1975 [illegible] "Basic skills," "Finance, productivity, and [illegible] and "Education and work" partiall[illegible] completion of some programs transfer[illegible] OE and OEO. The increase in 1976 for [illegible] reflects the Council's priorities [illegible] more firmly established by new projects [illegible] each category—an action that establish[illegible] for new programs consistent with the [illegible] the Institute.

The categorical declines after 1973 are partially a result of the overall decline in NIE's total appropriation. NIE's early period was marked not only by unexpected funding limitations but also by unforeseen delays in establishing program direction, including the late appointment of a director and delayed formation of the Council.

The higher level of funding shown in FY 1973 in "Finance, productivity, and management" was caused by the forward funding approach used in the Education Voucher and Experimental Schools programs. Forward funding obligates funds in one fiscal year for work to be performed over several years. Both programs had been initiated prior to the establishment of NIE, and the lower funding levels in 1975-76 reflect the completion of the Experimental Schools Program.

In accordance with the Council's emphasis, "Dissemination" has received the greatest increase in the 1976 budget. "Education and work" has been completing components of its program during each of the fiscal years; therefore it shows a continuing decline. In the "Other projects" category, activities in handicapped and early childhood education and curriculum development in arts at the elementary school level were completed in 1975, eliminating the budget for this category in 1976. The decline in "Administrative expenses and intramural research" results from reduction in personnel through attrition in 1975, as the Institute moved to [illegible] smaller funding base.

In 1976 [illegible] 1975, a substantial portion of funds will be awarded to State education agencies to strengthen and extend their dissemination activities. Awards to State/local education agencies are expected to more than double between 1975 and 1976.

The "Other projects" category declined significantly between 1973 and 1974, and was eliminated in 1976. The approximately $11 million Field Initiated Research Grants program of 1973 was reduced to less than $4 million in 1974 and discontinued in 1975.

"Administrative expenses and intramural research," which includes payroll costs, almost doubled from 1973 to 1974 as NIE became a fully operating agency. The full staff was not hired until late in 1973; thus, operating expenses were below a normal level for that year.

NIE has always allocated most of its funds to issues involving elementary and secondary education and will continue to do so in 1976. However, the Institute is examining its future role in higher education.

Support for R&D institutions. A significant dimension of NIE support is that associated with three new kinds of institutions originally established by OE under the Cooperative Research Act: R&D centers, regional educational laboratories, and the ERIC clearinghouses. For more detail on the nature and history of these institutions see Chapter 4. A recent report by a panel of consultants, *R&D Funding Policies of the National Institute of Education: Review and Recommendations,*[18] makes a number of recommendations concerning future policy for support of laboratories and centers.

In 1964, total Federal support for two R&D centers was $1.0 million. (See Table 3.7.) The program expanded rapidly, and by 1966 there were 10 centers receiving $6.6 million. By 1968,

18. Roald F. Campbell et al., *R&D Funding Policies of the National Institute of Education: Review and Recommendations* (Washington: NIE, 1975).

13 centers received $14.6 million. NIE assumed primary responsibility for the R&D centers in 1973, providing the bulk of $16.8 million in support to 12 surviving centers. The unusually high funding levels of 1972 and 1973 reflect the emphasis of those years on career education R&D, much of which was conducted by the Ohio State Center for Vocational Education and other centers. (See Table 4.4.) In 1974, support of the 12 R&D centers dropped to $13.4 million, closer to the average of $12.2 million for the 1965-71 period.

Twenty regional education laboratories were established in 1966-67 in a network blanketing the continental United States. However, the regional concept soon fell victim to the leveling-off of funding and the withdrawal of support for more than half of the laboratories. In 1973, when responsibility for supporting the regional laboratories shifted from OE to NIE, 12 laboratories were supported at a level of $25.7 million.

Federal sponsorship of the R&D institutional infrastructure also extends to ERIC, a national information dissemination system created by OE in 1965 and funded since 1973 by NIE. ERIC provides ready access to reports of federally sponsored R&D and general educational R&D literature. Because ERIC is a service operation, its annual budget has remained steady. Table 3.7 shows that OE provided about $2 million for all ERIC operations in 1966, when only 12 clearinghouses were operating. By 1969, 19 clearinghouses were operating and the total cost of ERIC operations was $4.8 million. With a consolidation of several clearinghouses into a total of 17 in 1973, the cost of operations fell to $4.0 million and continued at that level in 1975.

Distribution of awards. Apart from the program and service categories under which NIE supports education R&D, other dimensions of the distribution of NIE funds show geographically where the larger concentrations of NIE awards from R&D are and which R&D topics are receiving larger numbers of NIE awards.

A total of States and the District of Columbia received awards of a half million dollars or more in 1973 and 1974 combined. The largest concentration of NIE support was in California, which received a total of $27.9 million in the 2 years. Pennsylvania received $15.8 million, followed by the District of Columbia with $13.6 million, Oregon with $11.0 million, and Ohio with $10.0 million.

Colorado, Massachusetts, Missouri, New York, Texas, and Wisconsin also received NIE support totaling $5 million or more in 1973 and 1974 combined. Table 3.8 presents annual amounts for these and other States.

The 10 States mentioned above, together with the District of Columbia, account for 75 percent

TABLE 3.7. *OE/NIE support of specialized institutions for programmatic research, development, and dissemination: FY 1964 – FY 1975*
(In thousands of dollars)

FY	R&D Centers		Regional Educational Laboratories		Educational Resources Information Center (ERIC)	
	Support*	No.	Support*	No.	Support**	No.
Total, 1964-75	$128,359		$203,254		$37,194	
1964	999	2	...	..	...	..
1965	3,494	6	...	..	...	..
1966	6,580	10	8,658	19	2,000	12
1967	11,295	13	17,669	20	2,881	14
1968	14,645	13	22,439	20	2,896	16
1969	11,847	13	23,363	20	4,818	17
1970	10,738	13	25,107	15	4,720	20
1971	12,749	12	24,231	15	3,646	19
1972	13,696	12	22,743	[illegible]	4,130	18
1973	16,849	12	21,697	[illegible]	4,038	18
1974	13,367	12	19,635	[illegible]	3,965	16
1975	12,100	10	17,712	[illegible]	4,100	16

*Includes funds for facilities and equipment.

**Includes funds for both the clearinghouses and support services.

Source: NIE.

TABLE [illegible]. *States in which NIE project support exceeded [illegible]000 in FY 1973 and FY 1974 combined*
(In thousands of dollars)

States	1973	1974	States	1973	1974
Total, United States	**99,722**	[illegible]731			
Alaska	388	[illegible]80	Nebraska	204	1,233
Arizona	786	27	New Hampshire	372	138
California	16,664	[illegible]48	New Jersey	326	950
Colorado	2,029	4,[illegible]97	New Mexico	797	189
Connecticut	530	70	New York	7,539	2,135
Dist. of Columbia	5,401	8,222	North Carolina	1,386	1,054
Georgia	570	130	Ohio	7,11[illegible]	2,888
Illinois	2,271	1,546	Oregon	8,483	2,542
Kentucky	580	107	Pennsylvania	6,641	9,177
Maryland	1,791	994	South Dakota	734	0
Massachusetts	5,456	2,014	Texas	4,849	3,131
Michigan	1,704	830	Virginia	1,020	347
Minnesota	4,110	345	Washington	3,004	360
Missouri	4,120	2,729	West Virginia	1,298	2,182
Montana	4,500	413	Wisconsin	2,543	3,779

Source: NIE, *Educational Research in Progress* (Washington: NIE, 1975).

of NIE's disbursable funds ($182.5 million total budget –$17.9 million agency operating costs =$164.6 million) in the 2 years.

It would be misleading to attach dollar values to the categories of R&D topics supported by NIE, as shown in Table 3.9, because of some double counting of projects that can be classified in two or more categories. Nonetheless, it is useful to see the quantity of projects under certain topics. NIE-supported R&D seems to focus on educational process more than on content. Even projects that imply R&D dealing with content, such as "Career education," are often focused on new arrangements or procedures for presenting the content rather than on new content itself.

Office of Education (OE). The creation of NIE in 1972 as an agency specializing in education R&D did not diminish OE's position as the Federal Government's primary instrument for administering policy related to public education below the graduate level. R&D activity continues in OE through the fostering of innovation and reform.

Table 3.10 shows funding detail of OE R&D programs included in the OMB special analysis of the 1976 budget outlays have been converted for

TABLE 3.9. *Major topics of projects supported by NIE: FY 1973*

Topic	Number of projects*	Topic	Number of projects*
Educational resources	23	Higher education	9
Educational change	19	Program evaluation	9
Experimental schools	17	Teacher education	9
Early childhood education	16	Instructional materials	8
Community involvement	15	Instructional programs	8
Small schools	15	Laws	8
Educational programs	14	Models	8
Career education	13	R&D centers	8
Evaluation	13	Behavior patterns	7
Information dissemination	13	Disadvantaged youth	7
Cognitive development	11	Educational environment	7
Problem solving	11	Educational objectives	7
Educational administration	10	Effective teaching	7
Academic achievement	9	Infant behavior	7
Educational research	9	Language development	7

*Projects that address more than one topic may be counted more than once.

Source: NIE, *Educational Research in Progress* (Washington: NIE, 1975).

TABLE 3.10. *OE obligations for R&D, by program: FY 1974 – FY 1976*
(In millions of dollars)

Program	1974*	1975**	1976**
Total	**220.9**	**218.3**	**342.8**
Emergency school aid	3.4	1.1	.9
Handicapped	36.4	37.2	51.0
Higher education	1.0	1.1	1.0
Continuing education centers	.3	.0	.0
Occupational, vocational, adult education	44.0	40.6	***165.9
Elementary and secondary education	107.3	115.9	97.2
Library resources	1.2	1.0	.0
Education activities overseas	.1	.0	.1
Education development	7.7	.0	.0
Indian education	14.0	14.2	14.2
Innovative and experimental programs†	.0	.0	3.1
Administrative expenses	5.5	7.3	9.4

*1974 figures are actual obligations.

**1975 and 1976 figures are obligation estimates.

***Although $165.9 million was requested, the actual appropriation for FY 1976 was $35 million: $18 million was appropriated for Part C (Research and Training); $16 million for Part D (Exemplary Demonstration); and $1 million for Part I (Curriculum Development).

†Early reporting to OMB did not include the entire program.

Source: OMB, unpublished data.

the purpose of comparability with other data. The 1976 figures reflect the administration's request and not the appropriation measure passed by Congress.

A major difference exists between OE and NIE in how program priorities are defined and resources allocated. NIE's programs are primarily carried out within a very broad and single authority, with priority areas identified by the National Council of Educational Research. OE's programs, in contrast, have multiple legislative authorizations, each stating different objectives. The three most consistent OE R&D activities, in order of the magnitude of their funding, have been the handicapped, adult, and higher education programs.

ESEA changes. OMB's Special Analysis of Education indicates that major changes are occurring in elementary and secondary education programs authorized by the ESEA and Emergency School Aid acts. Separate authorities have been discontinued for programs such as dropout prevention, nutrition and health, and title III of ESEA. Other existing discretionary activities, such as Arts and Humanities and Career Education, have been administratively consolidated under "special projects." OMB's analysis does not show the expanded authorization to use general program funds for evaluation of programs such as title I of the ESEA.

Most of the recent R&D growth in OE is a direct result of the 1974 modification of title IV of the ESEA, which authorizes funds for experimental and innovative programs. One set of programs, "Special Projects," was mandated in the legislation: metric system education, gifted and talented children, community schools, career education, consumer education, women's equity in education, and arts in education.

Other OE R&D programs are selected by the Commissioner of Education from discretionary authority. For 1976, discretionary programs include educational television programing (including Sesame Street and Electric Company), career education (in addition to mandated funding), and packaging and field testing of exemplary practice.

Evaluations. Table 3.11 shows available data on OE program evaluations performed in recent years by the Office of Planning, Budgeting, and Evaluation. These figures incorporate OMB's analysis of Follow Through, Emergency School Aid, and other programs as well as an estimated $4.6 million in administrative expenses in 1975.

Increases shown in recent years reflect "one percent evaluation" clauses in authorizations for basic education improvement. In practice, these clauses mean that 0.5 to 1 percent of appropriations for each program is reserved for evaluation of that program. For large programs such as

TABLE 3.11. *OE obligations for planning and evaluation: FY 1970 – FY 1975*

(In thousands of dollars)

Year	Obligations
1970	[illegible]
1971	[illegible]
1972	14,155
1973	[illegible]
1974	[illegible]
1975	[illegible]

*Includes direct budget of the Office of Planning, Budgeting and Evaluation as well as obligations for evaluations of Follow Through, Emergency School Aid, Career Education, Compensatory Education, and other OE programs.

Source: OE, Office of Planning, Budgeting and Evaluation, unpublished data.

title I of the ESEA and the Emergency School Aid Act, the increased resources for evaluation are sizable.

Office of Child Development (OCD). The diversity of R&D programs undertaken in 1973 by the Research and Evaluation Division of the Children's Bureau, Office of Child Development, is shown in Table 3.12. Only a few of these programs relate directly to education R&D, but all deal with conditions of childhood experience within which education succeeds or fails.

INTERAGENCY ESTIMATES OF SUPPORT FOR R&D ON EARLY CHILDHOOD AND ADOLESCENCE

In 1975, two interagency panels compiled estimates of total Federal expenditures for research on early childhood and adolescence.[19] The activities of 5 Federal departments and 17 major divisions (excluding the NSF) were accounted for. (See Appendix 2.)

Estimates produced by the two panels overlap considerably; it would therefore be misleading to display them in a table. The overlap results from double-counting of research projects that focus both on young children and adolescents. Examples

19. T. W. Hertz and Ada [illegible] Mann, *Toward Interagency Coordination: FY '75 Federal Research and Development Activities Pertaining to Early Childhood, Fifth Annual Report* (Washington: George Washington University, Social Research Group, 1975); Stephen P. Heyneman, *Toward Interagency Coordination: An Overview of FY '75 Federal Research and Development Activities Pertaining to Adolescence, Third Annual Report* (Washington: George Washington University, Social Research Group, 1975).

TABLE 3.12. *R&D obligations of the Office of Child Development, Children's Bureau, Research and Evaluation Division, by program: 1973*

(In thousands of dollars)

Program	Obligations
Total	**15,843**
Education for parenthood	2,859
Day care	2,240
Adoption and foster care	1,953
Early childhood	1,646
Head Start evaluations	1,627
Social policy	1,226
Social ecology	1,029
Emergency services and child abuse	968
Youth	564
Television	406
Information dissemination	354
Single parent families	236
Advocacy	232
Children's institutions	192
Other projects	311

Source: OCD, *Research, Demonstration, and Evaluation Studies* (Washington: OCD, 1974).

of double-counted projects are NIE's Experimental Schools and OE's Educational Technology projects.

Altogether 1,566 early childhood R&D projects and 1,239 adolescence projects were identified (not corrected for double-counting), with a dollar value of $260 million and $258 million, respectively. Eighty percent was classified as funding for applied R&D, in contrast to only 8 percent for basic research and 12 percent for planning, dissemination, utilization, and evaluation.

D. STATE AND LOCAL FUNDING

State Education Agencies (SEA's)

No systematic data exist on State support to education R&D as defined in this *Databook*. A survey of funds for education R&D (narrowly understood) offers some clues.[20] In 1973, $[illegible] million flowed through State departments of education in support of R&D, of which $30.9 million or 77 percent came from Federal sources, and $8.7 million or 22 percent from the States themselves. Other funds amounted to $0.3 million.

Table 3.13 is based on this survey. It is likely that the States missing in this tabulation actually were supporting some, although perhaps not all, R&D functions for education. The leading State

20. NSF, *Research and Development in State Government Agencies* (Washington: Government Printing Office, 1975).

TABLE 3.13. *Expenditures of State departments of education for education R&D, by source: 1973*
(In thousands of dollars)

State*	All sources	% from Federal sources	% from State sources	State*	All sources	% from Federal sources	% from State sources
Alabama	774	86.4	13.6	Missouri	458	97.8	2.2
Alaska	80	93.7	6.3	Montana	30	100.0	0
Arkansas	438	96.1	3.9	New Jersey	627	100.0	0
California	6,810	92.7	7.3	New York	987	100.0	0
Colorado	451	83.4	16.6	North Carolina	1,240	64.0	36.0
Delaware	100	53.0	47.0	North Dakota	286	100.0	0
Florida	664	100.0	0	Ohio	2,785	25.4	74.6
Georgia	1,678	85.8	14.2	Oklahoma	248	92.3	7.7
Hawaii	828	71.0	29.0	Oregon	1,867	100.0	0
Illinois	1,565	80.0	20.0	Pennsylvania	1,350	59.0	41.0
Indiana	277	39.4	60.6	South Carolina	713	50.9	49.1
Iowa	546	100.0	0	South Dakota	573	97.6	2.4
Kansas	495	100.0	0	Tennessee	1,126	91.4	8.6
Kentucky	697	97.1	2.9	Texas	3,759	67.8	32.2
Louisiana	10	0	100.0	Utah	1,097	50.7	49.3
Maine	196	64.3	35.7	Virginia	1,276	58.0	42.0
Maryland	365	62.5	37.5	Washington	458	98.3	1.7
Massachusetts	694	89.5	10.5	West Virginia	827	100.0	0
Michigan	813	99.7	.3	Wisconsin	209	89.0	11.0
Minnesota	1,976	48.5	51.5	Wyoming	23	56.5	43.5
Mississippi	559	86.0	14.0				

*Arizona, Connecticut, Idaho, Nebraska, Nevada, New Hampshire, New Mexico, Rhode Island, and Vermont report no education R&D expenditures and are excluded from this list.

Source: NSF, *Surveys of Science Resources* (Washington: Government Printing Office, 1975).

departments in total expenditures for R&D from all sources were California ($6.8 million), Texas, ($3.8 million), Ohio ($2.8 million), Minnesota ($2.0 million), and Oregon ($[illegible] million). States providing the largest amounts of support for education R&D from their own revenues were Ohio ($2.1 million), Texas ($1.[illegible] million), Pennsylvania ($0.6 million), and Utah ($0.5 million).

Local Education Agencies (LEA's)

Local expenditures for education R&D are difficult to trace either through school system budgets or through personnel assignments. School boards and the public may be reluctant to approve the use of local operating funds for R&D. The personnel category of "research director" in larger school systems is often understood to be an administrator and interpreter of standardized testing, not a researcher or developer.

Some school systems are involved in education R&D through their affiliation with a school study council. For example, 44 school systems in the Minneapolis–St. Paul area are affiliated with a school study council that conducts R&D on a variety of problems, with emphasis on curriculum and staff development.

Local expenditures for education R&D are sometimes traceable through the local products of R&D such as curriculum revisions, administrative reorganization, and staff development programs. New curriculums are the most visible products, as in the case of more than 100 9-week "quinmester" modules the Dade County (Florida) Schools developed in 1972-73.

E. FOUNDATION FUNDING

Support for education remains a major program focus of private foundations. Education, including both R&D and non-R&D activities, received 36 percent of all support foundations provided in 1972. Table 3.14 shows foundation awards for education as well as other subject areas and activities.

Table 3.15 shows that foundation policies for the support of education are in a period of flux. Project support for higher education has decreased by two-thirds, while endowment support has

TABLE 3.14. *Support provided by foundations, by area: 1969-72*
(In millions of dollars)

Area*	1969	1970	1971	1972
Total	793	1,066	784	716
Education	281	343	179	258
Health	121	156	131	172
Science	93	111	130	87
Welfare	136	174	154	67
International	59	106	95	66
Humanities	52	103	65	57
Religion	51	73	30	9

*All activities, including R&D.

Source: *Foundation News* (New York: Council on Foundations, 1974).

increased more than eightfold. Fluctuation in foundation support for elementary and secondary education is as great in some years as the total allocation to elementary and secondary education in other years. (For example, the decrease of $24.3 million from 1970 to 1971 exceeded the 1971 allocation of $15.7 million.)

The amount shown for "research" in education in 1972 represents 6 percent of all education funds. In the period from 1969 to 1972, awards for such work increased an average of only 3 percent per year.

These figures are based on a narrow definition of "research." When the definition of R&D as used in the *Databook* is applied to foundation-sponsored projects, a slightly different pattern emerges. For 1974, approximately 100 foundations appropriated funds for education R&D projects for an estimated total of $57 million. Eleven foundations allocated more than $1 million each, contributing 85 percent of all money. Table 3.16 lists these foundations and their dollar totals.

TABLE 3.16. *Foundations allocating more than $1 million for education R&D, and their allocations: 1974*
(In thousands of dollars)

Foundation	Allocation
Total	48,640
Ford Foundation	13,550
Lilly Endowment, Inc.	8,700
Carnegie Corporation of New York	7,590
Danforth Foundation	3,480
Alfred P. Sloan Foundation	3,260
W. K. Kellogg Foundation	3,030
Charles F. Kettering Foundation	2,520
Exxon Education Foundation	1,900
Commonwealth Fund	1,820
Andrew W. Mellon Foundation	1,760
Rockefeller Brothers Fund	1,030

Sources: NIE compilation from annual reports of the foundations (1974); *Foundation Grants Register* (Washington, D.C.: The Foundation Center, 1973, 1974, and updates).

In addition to these large foundations, 20 others are major supporters of R&D in education, with allocations of about $100,000 each. The remaining foundations fund small projects.

The programs of the 11 major foundations illustrate the range of education R&D activities foundations support. The following summaries are drawn from the foundations' annual reports and chiefly reflect programs and awards of the immediate reporting year.

The *Ford Foundation* supported projects and programs concerned with the financing of education as well as its planning and management, the development of staff efficiency and quality, alternatives to traditional schooling, postsecondary education, women and minorities, and research on the learning process. In addition, more than $6 million was allocated to R&D in the foundation's

TABLE 3.15. *Support of education provided by foundations, specific area: 1969-72*
(In millions of dollars)

Area	1969	1970	1971	1972
Total	281.2	343.3	179.0	258.0
Research	15.5	8.1	11.8	16.8
Elementary and secondary education	25.9	40.0	15.7	14.3
Higher education	143.0	161.7	88.7	49.8
Adult and vocational education	9.2	3.8	2.0	3.6
Student support	9.8	16.6	8.7	12.4
Endowment	11.4	7.9	9.2	96.3
Libraries and communication	28.0	40.7	34.6	23.5
Personnel development	3.2	9.3	8.0	10.9
Education associations	7.4	9.2	4.5	5.4
Buildings and equipment	27.9	46.0	23.2	24.9

Source: *Foundation News* (New York: Council on Foundations, 1974).

massive programs for developing and supporting educational infrastructure, primarily in developing nations.

Lilly Endowment, Inc., focused largely on postsecondary education. Its $8.7 million supported work toward the improvement of liberal arts curriculums, the linking of professional and traditional arts and sciences curriculums, and off-campus and interinstitutional lifelong learning projects. Some work on institutional governance was supported.

The *Carnegie Corporation of New York* concentrated its R&D work in several areas. For higher education, the focuses were program and curriculum development and evaluation. The corporation's Childhood and Government Project represents a major, sustained effort to explore the ways in which public institutions influence the lives and development of children in the United States. Other sizable efforts focused upon the development and evaluation of tests and the problems of testing. The corporation also supported work on collective bargaining in education.

The *Danforth Foundation's* support of R&D goes primarily to postsecondary education. Work was supported on the future of the teaching profession and the quality of college teaching, the performance of "new" student groups, changes in contexts of teaching and learning, and studies of institutional and programmatic effectiveness. For elementary education, work was funded on changing programs and models. Some education R&D centers were also established.

The *Alfred P. Sloan Foundation* supports the development of new educational technologies, new forms of linking technologies with humans in education, and strategies for bringing minorities into the professions.

The *Charles F. Kettering Foundation*, through its Institute for the Development of Educational Activities (I/D/E/A), allocated $2.5 million for innovative programs in U.S. schools. The foundation describes its current strong interests as the nature of schooling in the United States, emerging issues for secondary education, and its version of the individually guided instruction program.

The *Exxon Education Foundation* concentrated on three areas of work: studies of developments and practices in postsecondary education; programs for the dissemination of "proven" innovations to institutions of higher education; and programs for innovation in educational materials and technologies.

The *Andrew W. Mellon Foundation* sponsored activities to integrate various disciplinary areas into amalgamated courses of study to help overcome disciplinary limitations and make knowledge more easily applicable to societal concerns.

The *Rockefeller Brothers Fund* supported a broad range of activities, including development of new curriculums, explorations of alternative models for schools, work on competency based education, planning in higher education, and evaluations.

Two foundations concentrate on medical education. The *Commonwealth Fund* supported several major experimental programs for time-shortened degrees in medical and health care fields, including the development of new curriculums, researching requirements, and evaluations of results. The *W. K. Kellogg Foundation's* activities included curriculum development and innovative degree programs.

F. OTHER SPONSORS

Two categories have been missing from the discussion of sponsorship thus far: industry and higher education. Table 3.1 showed that industry provides about 40 percent of all R&D funds; colleges and universities, 5 percent. However, it is probably true that industries provide a smaller proportion of education R&D funds and that colleges and universities provide a larger proportion.

Industry's investment in education R&D is concentrated in two areas. First are instructional systems which derive from instructional materials, which in turn derive from the simple textbooks of past decades. Unlike a textbook, an instructional system like Project PLAN, in its eighth year of development at Westinghouse Learning Corporation, requires continuous testing and revision involving all the concepts and methods of R&D. Even textbooks are not so simple as they once were. Developers and publishers, among whom Science Research Associates and Sullivan Associates exemplify the R&D approach, have begun to design textbooks as tools that may be tested empirically for teaching rather than as vehicles for authors' views. The criteria for a textbook's performance are specified in terms of students' behavioral objectives, and the process of shaping the textbook toward its criteria is a form of applied R&D.

Educational technology, such as audiovisual equipment, is the second area of industrial investment in education R&D. Improvements in educational technology have been occurring continuously throughout this century, and as a consequence industry is constantly engaged in new R&D cycles that bring new devices to the market. In the past decade, the possibility of producing small, economical, solid-state, cartridge-driven audiovisual equipment led to a flurry of industrial R&D and subsequently to the "hands-on" revolution in the schools—direct access of children to the instructional media, using low-cost, sturdy new equipment.

The investment of colleges and universities in education R&D is very difficult to specify, for conceptual as well as empirical reasons. Colleges and universities draw from their own budgets in training R&D personnel, in supplying libraries and other research resources, in housing research projects, and to a limited extent in providing the direct costs of research projects intramurally. Therefore it is difficult to specify which categories of the higher education budget represent direct and/or indirect support of education R&D.

G. COORDINATION

Given the large variety of institutions involved, the differentiated nature of R&D processes, and the decentralized structure of American education, the coordination of education R&D becomes a problem. A major finding of the 1969 report, *Educational Research and Development in the United States,*[21] was the lack of an overall plan. Many would now dispute the desirability of a master plan, believing that the nature of the change process requires many competing ideas and change strategies. One strand of current thinking rejects the view that R&D is, or ever will be, a fully integrated system.[22] However, components of R&D are thought to be related in various ways: persons working on similar problems need to know the nature and results of each other's work; outputs from one group may be inputs to others; and policies affecting one element may have second-order effects on others. Whether or not a fully integrated system is achievable or desirable, some increase in the coordination of the elements seems to be called for.

Coordination activities properly take account of the entire "infrastructure" of education R&D, not only the funding of R&D but also such things as the upgrading of personnel competence, experimentation with R&D arrangements, and testing of the compatibility of regulations.[23] Coordination activities also provide for the introduction of a spectrum of views into the planning phase so that later phases will benefit from consensus on objectives and strategies.

One form that coordination takes is regulation. A wide variety of laws, regulations, guidelines, reporting requirements, contract clauses, and other regulators has important direct and indirect effects on the conduct of R&D. This complex topic has been investigated in a separate study sponsored by NIE.[24]

Coordination can be both formal and informal. In the latter category are the "invisible colleges" or informal communication networks that have been shown to be important to the development of many scientific fields.[25] Education research has been characterized by the weak development of such networks.[26]

The roles of cooperation and competition in R&D are not well understood. Clearly, large-scale programmatic efforts require the cooperation and coordination of diverse organizations and specialists. In fields in which there is consensus on the definition of problems, competition for recognition among individuals or teams attempting to solve the same problems has been a factor in scientific advance. In a field lacking such consensus, such as education, multiple strategies and

21. OE, *Educational R&D in U.S.*

22. Egon G. Guba and David L. Clark, *The Configurational Perspective: A New View of Educational Knowledge Production and Utilization* (Washington: Council for Educational Development and Research, 1974).

23. Stacy Churchill, *Modelling a National Educational R&D System: A Conceptual Framework* (Washington: National Institute of Education, 1974).

24. O. W. Markley, *The Normative Structure of Knowledge Production and Utilization in Education* (Menlo Park, California: Stanford Research Institute, 1976).

25. Diana Crane, *Invisible Colleges: Diffusion of Knowledge in Scientific Communities* (Chicago: University of Chicago Press, 1972).

26. C. E. Nelson, "The Communication System Surrounding Archival Journals in Educational Research," *Educational Researcher* (September 1972), pp. 13-16.

approaches appear to be called for. Thus it is hard to draw the line between duplication of effort and useful redundancy. In any case, much can be gained by increasing the availability of information about who is addressing what problems and how. Many efforts at coordination take the form of providing a loose integration of R&D efforts and useful cross-fertilization of work.

At the Federal level, many agencies sponsor work in education R&D, but only a few programs are designed primarily for the improvement of education. Many Federal programs serve multiple purposes and contain education R&D components in overall contexts such as health. Coordination is required to raise the effectiveness of these programs for education. Federal coordination of education R&D is not the responsibility of any single agency, but rather is embodied in a variety of interagency panels, committees, and ad hoc task forces. The key Government groups are discussed below. Coordinating groups and activities outside of the Federal Government are not included at this time.

Federal Interagency Committee on Education (FICE)

FICE was established by Executive order and is chaired by the Assistant Secretary for Education. Representatives of the 24 member and 5 observer agencies meet monthly to examine education needs and make policy recommendations to the President. (See Appendix 2.) Much work is accomplished through subcommittees focused on specific issues. In 1975 FICE established a Subcommittee on Educational Research, Development, Dissemination, and Evaluation, chaired by Harold L. Hodgkinson, Director of NIE. The subcommittee has examined such issues as the implications of legislation on the protection of human subjects and on privacy for the conduct of R&D. It is seeking ways to facilitate the exchange of information on activities of member agencies.

Interagency Panel for Research and Development on Early Childhood and the Interagency Panel for Research and Development on Adolescence

These panels define their domain in terms of age groups rather than in a concern for education, although the overlap is obviously considerable. The Executive Director of both panels is Dr. Edith Grotberg, Director of the Research and Evaluation Division, Office of Child Development, HEW Types of issues dealt with include the attempt to identify "marker variables" which all researchers in certain fields would use to provide common reference points across research projects. "Marker variables" contribute to the cumulative nature of research. Each year these panels sponsor the collection of data on projects currently sponsored by member agencies and publish reports analyzing the projects in terms of a number of key variables.[27]

National Council for Educational Research (NCER)

The NCER, strictly speaking, is the policy-making board of NIE, not an interagency coordinating group; however, NIE is the only agency with an explicit responsibility for strengthening the education R&D system. The meetings of the Council are open and are attended by representatives of various interest groups. Thus the Council provides a forum for the discussion of the chief policy issues facing education R&D.

Joint Dissemination Review Panel (JDRP)

The JDRP assesses the claims of effectiveness made for products developed under OE or NIE projects. It certifies which products have sufficient demonstrable effectiveness to deserve dissemination. The Panel's responsibilities do not include formulating or reviewing dissemination plans, which are functions of the sponsoring unit. By the end of 1975, the Panel had reviewed more than 100 projects with some 70 justifying dissemination.

Dissemination Policy Council (DPC)

The establishment of the DPC reflects a growing concern within the HEW about overlaps in the dissemination activities of OE and NIE. Such overlaps may be precipitated by the two agencies' combined total of some 208 legislative mandates or regulations dealing with dissemination issues.

The DPC consists of two representatives each from OE and NIE and is chaired by a member of the immediate staff of the Assistant Secretary for Education. It reviews the dissemination activities in the two agencies and tries to specify the scope

27. Heyneman, *Toward Interagency Coordination: Overview of FY '75 Federal R&D. . .Adolescence;* Hertz and Mann, *Toward Interagency Coordination: FY '75 Federal R&D. . .Early Childhood.*

of an adequate dissemination program for the Division of Education and the allocation of responsibilities between OE and NIE.

Interstate Project on Dissemination (IPOD)

As a means of identifying State concerns with dissemination policy, NIE has supported IPOD, in which State education agency personnel from Rhode Island, New Jersey, Kentucky, Texas, Oregon, Montana, and North Carolina (the grant recipient) have carried out legislative and other studies intended to suggest an appropriate State education agency dissemination role and its relationship to the Federal Government. IPOD has provided technical reports to the Council and plans are now underway to enlist the participation of IPOD personnel in the formulation of the DHEW Division of Education dissemination policies. Their policy statement is available from the North Carolina Department of Public Instruction.[28]

28. Interstate Project on Dissemination, *Report and Recommendations* (Raleigh, North Carolina: North Carolina Department of Public Instruction, 1976).

CHAPTER 4
CONDUCT OF EDUCATION R&D

A. BACKGROUND FACTORS

Performers

The changing context of education R&D is reflected in part by the large proportion of activity conducted in organizations that did not exist 10 years ago. Some are entirely new; others are adaptations or modifications of older institutions. Some have developed with direct Federal support for their operations, including construction of buildings and purchase of equipment. Others have evolved without direct support and even in spite of competition from federally supported institutions. The growth in the number and types of new institutions is paralleled in part by changes in size and nature of the work force in education R&D. An understanding of some of these dimensions in the perspective of the past 10 years should contribute to a more accurate interpretation of current data on the organization of and individual performers in education R&D.

Data presented by Gideonse[1] show that in 1965 OE awarded 77 percent of its R&D funds to colleges and universities. This high percentage was no doubt influenced by the terms of the Cooperative Research Act, which authorized awards only to academic institutions and State departments of education. Also, Federal priorities emphasized funding for research rather than for other functions. Most education R&D in 1965 followed the tradional pattern of academic research, as summarized by Gideonse:

> Individual faculty members of (colleges and universities), singly or together, prepare proposals for work they would like to perform . . . Procedures for gaining support . . . follow familiar pattersn. College and university faculty members are constrained in their pursuit of research funds only by the policies of their respective institutions.[2]

Deficiencies in this pattern became more evident to Federal sponsors of education R&D as pressures increased on the mission-oriented agencies to show progress in the solution of problems. Gideonse was preparing his review of education R&D during the period of transition from individual research to that carried out in large R&D organizations and thus noted:

> Increasingly, colleges and universities are establishing new administrative positions for the coordination of research activities. . . .
>
> The development of the network of regional education laboratories was guided by the understanding that no single existing institution was strategically located or empowered to relate effectively all segments of the educational community whose involvement was necessary to produce quality educational change through educational development throughout the highly decentralized United States school system. . . .
>
> The Research and Development Centers program . . . was a response to at least three major concerns relating to prior project research and development efforts. The first was that previous efforts tended to be small and fragmentary and the results neither conclusive nor cumulative in character. Second, project efforts were not closing the gap between research and practice. . . . Third, the field of education had not

1. Office of Education, *Educational Research and Development in the United States* (Washington: Government Printing Office, 1969).

2. Ibid., p.69.

attracted the research personnel from the behavioral and social sciences even though their active involvement with educational problems was both necessary and desirable. The Research and Development Centers program was an attempt to supplement the small-scale efforts with broader progress of interrelated activities to overcome these problems.[3]

The question of "Who conducts educational R&D?" can therefore be answered only within a time dimension that shows marked change from one decade to the next. Ten years ago the individual research model was dominant, and large R&D organizations were just emerging. Five years ago there were more regional education laboratories and R&D centers than there are today, but many large nonprofit and for-profit organizations were beginning to "retool" from defense research and other activities for social R&D.

In1947, NIE committed nearly half of its total awards ($30 million of $65 million) to regional education laboratories and R&D centers. Only two of these organizations had progressed beyond the planning stage 10 years earlier.

"Who conducts educational R&D?" also is answered in terms of the topic and/or function of the R&D. For example, those working in NIE's Field Initiated Studies (FIS) research projects in 1973 were primarily college and university faculty members (82 percent of the FIS funds). Personnel in nonprofit organizations received 12 percent of the FIS funds, leaving only 6 percent for others.[4]

The evaluation of social intervention and assistance projects is a recent and rapidly growing activity. Biderman and Sharp[5] analyzed award patterns for DHEW evaluation contracts in 1971. Nonprofit organizations received 29 percent; college and university faculty, 21 percent. Forty-five percent of all awards went to organizations in the profit sector, with only 5 percent going to all others. It is likely that the overall distribution of evaluation contracts in the field of education follows this general pattern. Possibly the great flexibility of profit-sector organizations allows them to compete so successfully in this new and burgeoning field.

3. Ibid., pp. 69-70, 75.

4. National Institute of Education, *Building Capacity for Renewal and Reform* (Washington: NIE, 1973).

5. A. D. Biderman and L. M. Sharp, *The Competitive Evaluation Research Industry* (Washington: Bureau of Social Science Research, 1972).

Personnel

The size of the education R&D work force may presently be estimated at from 5,000 to 15,000 researchers and developers; the estimate of size depends on the criteria used to include or exclude persons on the periphery of R&D activities as well as those persons in the mainstream who have less than doctoral and/or research training. Estimates in the lower range tend to include only researchers and developers "at the bench" in R&D organizations. Estimates in the higher range are derived from counts of those with nominal R&D affiliation, such as membership in the American Educational Research Association (AERA) and relevant divisions of the American Psychological Association (APA) and the American Sociological Association (ASA).

Over the past decade, there has been less apparent change than might be expected in the disciplinary background of persons working in education R&D. In 1965, roughly equal proportions of education researchers and developers had backgrounds in education and psychology (46 and 44 percent), while only 10 percent represented all other disciplines and fields. In 1974, judging from the backgrounds of those who applied for NIE support, 42 percent of the education R&D work force had an education background, 38 percent a psychology background, and 20 percent other backgrounds. Only in the increased proportion of researchers and developers coming to education R&D from other disciplines and fields is the work force changing.

B. R&D INSTITUTIONS

Relatively few R&D institutions conduct only education R&D to the exclusion of related activities such as basic psychological or sociological research, or applied research in other public sectors such as health care. The regional education laboratories, education R&D centers, and bureaus of education research operating within schools of education are examples of institutions conducting only education R&D. General purpose R&D institutions are exemplified by the Rand Corporation, National Opinion Research Center, Institute for Social Research (Michigan), and the American Institutes for Research. These are important

TABLE 4.1. *OE/NIE funding of education R&D, by type of recipient organization, selected years*
(Percent of total funds)

Recipient	OE Awards FY65	OE Awards FY68	NIE Awards FY73	NIE Awards FY74
Total	100	100	100	100
Colleges and universities	77	56	35	29
Nonprofit organizations	10	32	41	54
For-profit organizations	0	2	6	6
State and local governments	13	5	18	6
Other institutions and individuals	Less than 1	5	Less than 1	5

Sources: OE, *Educational Research and Development in the United States* (Washington: Government Printing Office, 1969); NIE.

resources for R&D in education, but the proportion of their effort devoted to this topic fluctuates from year to year as the budgets and goals of R&D sponsors shift.

Table 4.1 shows the trend away from academic work in education R&D from 1965 to 1974, as nonprofit organizations and those in the profit sector developed a capability to respond to Federal initiatives.

A minimum estimate of the number of institutions that conduct some amount of education R&D is found in the Gale *Research Centers Directory* and its supplement, the *New Research Center Directory*.[6] These sources list about 500 centers under the heading of research in education, although the number of nonduplicated listings is difficult to determine because of mergers, spinoffs, name changes, and geographical relocations.

The general relationship between the number of institutions performing education R&D and the dollar value of education R&D performed is illustrated in Table 4.2, which shows the small number of institutions that accounted for the majority of NIE awards between FY 1973 and FY 1975.

Regional Education Laboratories

One of the most significant and interesting experiments in R&D planning and management in the past decade is the network of regional education laboratories. Gideonse traced the origins of this experiment to the deliberations of the Task Force on Education, appointed by President Lyndon Johnson, which worked during the fall of 1964.

He described the laboratories as follows:

> The laboratories are independent, nonprofit corporations with their own governing boards and management. Responsibility for decisions regarding program objectives, personnel, allocation of resources, and program operation resides in the governing boards of the laboratories. Each laboratory has identified strategic program areas relating to problems of national significance.[7]

OE and NIE have administered Federal support of the regional education laboratories, since their creation under the ESEA of 1965. The program began as a network of 20 institutions blanketing the country (although regional boundaries did not necessarily follow State lines). The program came under attack almost as soon as it was started, projected budget growth failed to materialize, and within a few years OE support was withdrawn from a number of laboratories; the regional network concept was thus destroyed. (Table 4.3 describes the funding history of the individual laboratories.) With Government encouragement, development came to be defined as the central functional emphasis, and in many cases the programs became more national than regional. In 1973 NIE shifted its basis of support from each laboratory's total operations to its constituent programs. In 1975-76, NIE started reexamining its funding policies generally and its relationship to the laboratories and centers specifically.[8]

6. A. M. Palmer, *New Research Centers Directory* (Detroit: Gale Research, 1972-74); Palmer, *Research Centers Directory* (Detroit: Gale Research, 1972).

7. OE, *Educational R&D in U.S.* (1969), p.70.

8. Roald F. Campbell et al., R&D *Funding Policies of the National Institute of Education: Review and Recommendations* (Washington: NIE, 1975).

TABLE 4.2. *Organizations receiving $500,000 or more in NIE funding support:* FY 1973-75*
(In thousands of dollars)

Organization	State	Funding	No. of Projects
Mountain Plains Education and Economic Development Program, Inc.	Montana	$10,162	1
D.C. Public Schools	D.C.	5,067	1
Alum Rock Union Elementary Schools	California	4,777	1
Abt Associates	Massachusetts	4,328	5
National Urban League	New York	4,108	2
Federation of Rocky Mountain States, Inc.	Colorado	4,098	1
Education Development Center (EDC)*	Massachusetts	3,130	2
Minneapolis Public Schools	Minnesota	3,057	1
Opportunities Industrialization Center	Pennsylvania	2,920	1
American Institutes of Research (AIR)	Maryland	2,427	9
Franklin Pierce School District	Washington	2,305	1
RAND	California	2,270	7
Appalachian Regional Commission	D.C.	2,050	1
Stanford Research Institute	California	1,769	6
California State Department of Education	California	1,766	3
University of Mid-America	Nebraska	1,418	1
Alaska State Office of Telecommunications	Alaska	1,315	1
Aries Corporation	Virginia	1,287	2
South Carolina State Department of Education	South Carolina	1,254	5
Educational Testing Service	New Jersey	1,064	11
University of Washington	Washington	1,011	5
South Umpqua School District	Oregon	992	1
Development Associates	D.C.	879	1
University of California, Berkeley	California	842	9
Stanford University	California	814	12
Center for New Schools	Illinois	802	4
Northwestern University	Illinois	799	4
Syracuse University Research Corporation	New York	796	4
Lead Deadwood Independent School District	South Dakota	734	1
Constantine Public School System	Michigan	716	1
Palominas Elementary School District	Arizona	700	1
University of Minnesota	Minnesota	656	3
C.M. Leinwand, Inc.	Massachusetts	627	1
University of Michigan	Michigan	610	9
Research Triangle Institute	North Carolina	607	1
Systems Development Corporation	California	602	2
Columbia University	New York	590	11
Gallaudet College	D.C.	582	1
Hancock County Schools	Kentucky	568	1
University of Georgia	Georgia	552	6
University of Illinois	Illinois	531	10
Perry County School District	Mississippi	518	1
University of Chicago	Illinois	509	11

*Excludes EDC program funded as an Educational Laboratory.

Source: NIE.

R&D Centers

R&D centers are another type of nonprofit R&D organization receiving continuing NIE support. Whereas the laboratories were entirely new institutions, the centers represented an organizational strategy for capitalizing on existing institutional strength to undertake additional programmatic efforts. Each center had a mission focused on a significant educational problem and was to bring together interdisciplinary teams to plan and mount systematic attacks on each problem. These efforts were to span the entire process of research, development, dissemination,

TABLE 4.3. *OE/NIE institutional and major program support of regional education laboratories, selected years*
(In thousands of dollars)

Laboratory	Total 1966-75	1966	1968	1970	1972	1974	1975
Total, all laboratories	203,254	8,658	22,439	25,107	22,743	19,635	17,712
Appalachia Educational Laboratory (AEL)	11,972	461	994	1,126	1,404	2,033	1,540
Center for Urban Education (CUE)	16,690	919	2,675	2,600	2,219	...	...
Central Atlantic Regional Educational Laboratory (CAREL)	1,740	...	780	...	...	...	...
CEMREL	18,127	836	1,350	2,221	2,385	2,218	2,089
Cooperative Educational Research Laboratory (CERLI)	1,440	189	600	...	...	...	...
Eastern Regional Institute for Education (ERIE)	4,028	200	943	844	...	...	...
Education Development Center (EDC)	4,011	168	1,041	950	...	...	...
Far West Laboratory for Educational Research and Development (FWLERD)	19,654	458	1,250	2,373	2,570	1,818	2,760
Michigan-Ohio Regional Educational Laboratory (MOREL)	1,669	184	800	...	...	...	...
Mid-Continent Regional Educational Laboratory (McREL)	7,002	759	730	957	910	202	...
National Laboratory for Higher Education (NLHE)	13,115	190	694	1,078	1,017	496	...
Northwest Regional Educational Laboratory (NWREL)	13,958	571	1,544	1,841	1,889	1,818	3,364
Research for Better Schools (RBS)	29,528	503	2,089	3,397	3,652	5,081	3,930
Rocky Mountain Educational Laboratory (RMEL)	1,917	411	514	...	...	...	...
South Central Regional Educational Laboratory (SCREL)	1,652	181	700	...	...	...	...
Southeastern Educational Laboratory (SEL)	3,662	503	670	720	...	...	...
Southwest Educational Development Laboratory (SWEDL)	16,737	216	1,400	2,062	2,160	2,035	1,837
Southwestern Cooperative Educational Laboratory (SWCEL)	6,185	294	752	956	1,109	...	...
Southwest Regional Laboratory for Educational Research and Development (SWRL)	26,027	957	2,235	3,024	[illegible]	3,934	2,192
Upper Midwest Regional Educational Laboratory (UMREL)	4,140	658	678	958	...	...	...

NOTE.—As independent agencies, laboratories receive support from various Federal and non-Federal sources. Funds shown through 1972 for OE represent only those received from the budget line for laboratories administered by the Division of Educational Laboratories; funds received from other OE programs are not included. Under NIE there was no separate budget line for laboratories during 1973-75, and funds received from all NIE programs are shown.

Source: NIE.

and utilization. Working relationships with school systems were encouraged. It was recognized that the problems were complex and that it would be at least 5 to 10 years before significant results could be expected.

Eleven such R&D centers were established under the Cooperative Research Act between 1964 and 1966. Several other organizations that came to be known as centers had somewhat different origins. Two research centers were established under the Vocational Research Act. A National Laboratory on Early Childhood Education was established, with a coordination center and small research centers at seven universities. A project for developing management information systems for higher education institutions evolved into a center. Two educational policy research centers were started.

Most of the centers are found in universities, both within and outside the administrative framework of schools of education. Attrition among the centers has been less than that for laboratories. (See Table 4.4.) As with the laboratories, however, NIE shifted the basis of its decision making from the institution level to the program level and is currently reevaluating its support policies.

ERIC

A third institutional network established with Federal sponsorship was the Educational Resources Information Center (ERIC). Because of the decentralized nature of U.S. education, ERIC designers decided on a network of clearinghouses

TABLE 4.4. *OE/NIE institutional and major program support of education R&D centers, selected years*
(In thousands of dollars)

R&D centers	Total 1964-75	1966	1968	1970	1972	1974	1975
Total, all centers	128,359	6,580	14,645	10,738	13,696	13,367	12,100
Center for Advanced Study of Educational Administration, University of Oregon	8,242	663	590	596	681	388	1,044
Center for Occupational Education, North Carolina State University	4,693	...	725	360	450	157	...
Center for Research and Development in Higher Education, University of California at Berkeley	6,537	316	1,459	879	890	100	...
Center for Research and Development in the Study of Individual Differences, Harvard University	3,953	1,112	868	...	...	...	...
Center for the Study of the Evaluation of Instructional Programs, University of California at Los Angeles	7,229	409	868	648	686	313	868
Center for Urban Education*	1,020	1,020					
Center for Vocational and Technical Education, Ohio State University	17,040		1,500	1,149	2,320	2,585	1,335
Learning Research and Development Center, University of Pittsburgh	18,317	1,042	1,400	1,465	1,811	2,529	2,454
National Center for Higher Educational Management Systems, WICHE**	6,946	...	127	284	926	1,693	1,507
National Program in Early Childhood Education, CEMREL***	11,055	...	1,465	1,486	1,560	392	128
Research and Development Center on Cognitive Learning, University of Wisconsin	17,092	808	1,688	1,298	1,803	2,811	2,332
Research and Development Center on Educational Stimulation, University of Georgia	3,420	401	1,190	339	...	...	...
Research and Development Center on the Social Organization of the Schools, Johns Hopkins University	5,072	...	742	650	650	167	491
Research and Development Center on Teacher Education, University of Texas	6,624	459	...	656	805	984	850
Stanford Center for Research and Development in Teaching, Stanford University	11,119	350	1,597	928	1,114	1,248	1,091

*Administered in its first year as an R&D center by a consortium of New York universities, transferred to the Regional Laboratory Program in 1967.

**Western Interstate Commission on Higher Education.

***Transferred from the University of Illinois in 1970; primary contract with CEMREL terminated in 1973. Figures for 1974 and 1975 represent support to the Demonstration and Research Center for Early Education at Peabody University.

NOTE.–As independent agencies, centers receive support from various sources, Federal and non-Federal. Funds shown through 1972 for OE represent only those received from the budget line for centers administered by the Division of Educational Laboratories (or the Vocational Research Division in the case of Ohio State and North Carolina State); funds received from other OE programs are not included. Under NIE there was no separate budget line for centers during 1973-75, and funds received from all NIE programs are shown.

Source: NIE.

ration on a single center in Washington, D.C. These clearinghouses were based mainly in universities and professional associations. Contracts developed with the clearinghouses gave them responsibility for selecting, acquiring, critiquing, cataloging, indexing, and abstracting all documents in their subject areas.

ERIC offers two unique services. First, it provides abstracts of all materials. These abstracts are available either in monthly catalogs or on computer tapes.

Second, ERIC provides inexpensive microfiche of the complete text of many "fugitive" noncopyrighted and unpublished materials such as project reports and speech texts. Because the clearinghouses operate with close contact with practitioners and researchers in their respective fields, ERIC is the only national bibliographic resource to capture such "fugitive" educational materials. To make these materials available, the separate clearinghouses were integrated through a central computerized facility capable of serving as a "switching" center for the entire network.

Table 4.5 shows Federal funding of ERIC in selected years between 1966 and 1975.

Prolific R&D Performers

Institutions that perform large amounts of education R&D leave a documentary trace of themselves over time. The acquisitions program of ERIC since 1966 insures that all active workers in

TABLE 4.5. *OE/NIE obligations for ERIC, selected years*
(In thousands of dollars)

Clearinghouse*/support service	1966	1969	1973	1975
Total	2,000	4,818	4,038	4,100
Clearinghouses, subtotal	(1,767)	(3,527)	(3,271)	(3,296)
Career Education	...	...	...	232
(Adult Education)	...	181	44	...
(Vocational and Technical)	88	175	270	...
Counseling and Guidance	91	191	172	158
Early Childhood	...	310	185	164
Educational Management	90	186	150	183
(Educational Facilities)	...	181	...	...
Foreign Languages	198	200	175	195
(Linguistics)	164	135	...	...
Handicapped and Gifted**	254	165	250	206
Higher Education	...	125	118	223
Information Resources	...	...	...	240
(Educational Media and Technology)	...	180	120	...
(Library and Information Science)	...	186	104	...
Junior Colleges	109	191	149	***101
Reading and Communication Skills	...	...	312	291
(Reading)	156	201	...	...
(English)	...	176	...	...
Rural and Small Schools	130	181	207	216
Science, Mathematics and Environmental Education	122	191	189	240
Social Studies and Social Sciences	...	...	194	201
Teacher Education	135	171	251	222
Tests and Measurements	...	...	124	196
Urban Education†	230	201	257	228
Support services, subtotal	(233)	(1,291)	(767)	(804)
Current Index to Journals in Education	...	40	90	75
ERIC Document Reproduction Service	25	150	70	80
Printing	30	80	55	50
Processing and Reference Facility	178	953	547	573
Requirements and Analytical Studies	...	68	5	26

*Clearinghouses listed in parentheses have been merged with the Clearinghouse appearing immediately above.

**Formerly Exceptional Children Clearinghouse.

***1975 funding for eight months.

†Formerly Disadvantaged Clearinghouse.

Source: NIE.

R&D education in the United States are substantially represented in the ERIC collection. (Note, however, that reports are better represented in ERIC than are products.)

Table 4.6 was generated from the ERIC collection by tabulating the number of reports accessioned from each source in the years 1968 and 1973. Many of the "prolific" sources listed in each year are not performers of R&D (for example, Congress and the executive departments), but among the R&D institutions there is much continuity across the 5-year interval. Fourteen of the R&D institutions listed for 1968 are also listed for 1973 (creating an overlap of 51 percent).

State Departments of Education

A 1969 study of State departments of education showed that 38 of them maintained organizational units that performed research, development, dissemination, or evaluation functions.[9] Of

9. H. M. Brickell, *Survey of State Education Department Research, Development, Demonstration, Dissemination, and Evaluation (RDDDE), 1969* (New York: Institute for Educational Development, 1971).

TABLE 4.6. *Producers of 50 or more reports accessioned by ERIC in 1968 and/or 1973*

Producer	1968	1973
Federal Government	Department of Health, Education, and Welfare Department of Labor	Congress of the United States Department of Commerce Department of Defense Department of Health, Education, and Welfare Department of Labor United States Naval Academy
State government	California State Department of Education New York State Department of Education	New York State Department of Education
Local government	...	Dade County Board of Public Instruction
Colleges and universities	Columbia University George Washington University Michigan State University at East Lansing Ohio State University at Columbus Stanford University University of California at Berkeley Univeristy of Illinois at Urbana University of Indiana at Bloomington University of Oregon at Eugene University of Pittsburgh University of Texas at Austin University of Wisconsin at Madison	City University of New York Florida State University at Tallahassee Harvard University Ohio State University at Columbus Pennsylvania State University at University Park Stanford University University of California at Berkeley University of California at Los Angeles University of Georgia at Athens University of Illinois at Urbana University of Indiana at Bloomington University of Michigan at Ann Arbor University of Minnesota at Minneapolis-St. Paul University of Pittsburgh University of Texas at Austin University of Wisconsin at Madison
Nonacademic research organizations	Human Engineering Institute	American Institutes for Research Educational Testing Service Rand Corporation Westinghouse Learning Corporation
Professional associations	International Reading Association Modern Language Association National Council of Teachers of English National Education Association	American Association for Health, Physical Education and Recreation International Reading Association National Council of Teachers of English National Education Association
Other	...	United Nations Educational, Social and Cultural Organization

Source: NIE, *Current Index to Journals in Education* (New York: CCM Information Corp., 1974).

these, 29 reported Federal funding for some or all of their research activities; 25 reported funding for development; 17 for demonstrations; and 28 each, for dissemination and evaluation.

Other available information suggests these numbers are low. OE's listing of State departments of education personnel indicates that all of these departments have some personnel performing such functions. This finding is supported by the results of Educational Testing Service (ETS) surveys of all 50 States, the District of Columbia, and U.S. territories:[10] all had some kind of R&D unit in their departments of education. For example, all were coordinating statewide testing and assessment programs that provided data for decision making at state and local levels.

According to these same ETS studies, statewide educational assessment is mandated by the legislatures of 16 States and introduced by State department of education personnel in the other States. Sources of funding for assessment are title III of ESEA and other Federal sources (24 States), the States themselves (23 States), and school districts and other sources (6 States). The cognitive areas most frequently assessed are, in descending order, mathematics, reading, language skills, natural science, social science, aptitude, and study skills. Purposes served by the assessments are, in descending order, instructional evaluation, identification of individual problems and talents, guidance, providing data for a management information system, and placement and grouping.[11]

School Systems

Edith Mosher, in a study[12] of larger school districts in 1969, reported that local R&D tasks can be identified as administrative support, planning, independent evaluation, instructional development, and data processing. When extrapolated to include smaller school districts, her data suggest that of the 16,000 districts, 300 to 350 maintained R&D offices.

The Research Division of the National Education Association conducted a study of 102 school research offices in 1965 and reported that student testing, preparation of department reports, collection of information and data from other districts, and consultant services occupied the staff of the offices much of the time. With increased field testing of educational programs (most of which originate outside of the school districts) as well as an increased obligation to evaluate local programs funded by the Federal Government and other sponsors, the school research office plays a vital coordinating role. It determines the amount and kind of R&D, initiated both internally and externally, in which the school district should participate.

C. R&D PERSONNEL

Prior Estimates of the Work Force

Excellent estimates of the numbers and qualifications of scientific personnel have been provided by the NSF in the biennial publication, *American Science Manpower*, compiled from the NSF *National Register of Scientific and Technical Personnel.* As a matter of policy, however, the field of education R&D is not reported apart from psychology, sociology, and the other disciplines in which most education R&D personnel have been trained. Therefore we cannot turn to *American Science Manpower* for estimates of the education R&D work force.

To supply the missing data, Ohio State University conducted a questionnaire study in 1964-65 and released the results as the *National Register of Educational Researchers* in 1966. Demographic data from the survey appear in Table 4.7. The indirect approach of the survey indicates the difficulty and ambiguity associated with personnel estimation in education R&D. Lists of names of persons possibly engaged in education research were compiled from directories of professional associations, abstracts, journals, and reports of then-active research projects, and from personal contacts with people in State and local governmental units supporting or carrying out education R&D. Seventeen thousand nonduplicated names were found; of these, addresses were available for 12,000. Questionnaires were mailed to the latter, and usable responses were obtained from 6,800 of those contacted; of the 6,800, screening criteria excluded 800. The remaining 6,000 names were

10. Educational Testing Service, *State Educational Assessment Programs* (Princeton, N.J.: ETS, 1973); ETS, *State Testing Programs* (Princeton: ETS, 1973).

11. Ibid.

12. Edith K. Mosher, *What about the School Research Office?* (Berkeley, Calif.: Far West Laboratory for Educational Research and Development, 1969).

published by Phi Delta Kappa in the *National Register of Educational Researchers.*

In 1969, using data from several sources, David Clark and John Hopkins attempted a more precise estimate of the education R&D work force.[13] They estimated R&D personnel in colleges and universities (2,475), school systems (540), Government agencies and interagency organizations (570), business and industry (150), professional associations (90), and other research institutes and organizations (300). The total of 4,125 education R&D personnel was intended to be a best estimate for the year 1964; estimates of R&D personnel in each type of employment were within a few percentage points of the Ohio State data reported in Table 4.7.

TABLE 4.7. *Selected characteristics of education R&D personnel: 1965*

Characteristic*	Percentage
Sex	
Male	85
Female	15
Age	
25-30	3
31-40	33
41-50	35
51-60	21
61 and older	8
Highest degree	
Bachelor's degree	1
Master's degree	16
Doctorate	82
Professional and other	1
Major field of highest degree	
Education	46
Psychology	44
Sociology	5
Other social sciences and humanities	3
Physical and biological sciences	2
Major field of present professional identification	
Education	52
Psychology	40
Sociology	5
Other	4
Research area**	
Curriculum	82
Teaching-learning process	28
Administration, organization	14
Testing, measurement, and evaluation	14
Guidance, counseling, and school psychology	11
Education research itself as a subject of research	9
Personnel	5
Other	2
Present employment	
College and university	64
School system	16
Government agency	9
Business and industry	4
Foundation	3
Other	4

*Based on first 3,923 responses in the Ohio State survey.

**Multiple responses add to more than 100 percent.

Source: Phi Delta Kappa, *National Register of Educational Researchers* (Bloomington, Ind.: PDK, 1966).

Estimation of the Current Work Force

In the absence of a current national survey, several methods of estimating the education R&D work force converge on a 1974 estimate of 10,000 plus or minus about 2,000 researchers and developers.

Clark and Hopkins Estimate. In 1969, David Clark and John Hopkins projected a "best estimate" of the 1974 educational work force at 8,522 persons, while their most optimistic projection for 1974 was 12,373 persons. In a 1971 update, Hopkins commented that the 1969 projections were affected by "the heady atmosphere which prevailed after the passage of the Elementary and Secondary Education Act in 1965."[14] In his update, Hopkins projected 8,669 persons in the 1974 education R&D work force, divided roughly into 33 percent research personnel, 50 percent development personnel, and 17 percent diffusion personnel.

Professional Association Memberships. Three associations contain the greatest concentration of education researchers and developers: the American Educational Research Association (AERA), the American Psychological Association (APA), and the American Sociological Association (ASA). AERA and relevant divisions of APA and ASA have a total membership of 21,385 members. Although memberships overlap to an unknown extent among divisions of APA and ASA, most

13. D. L. Clark and J. E. Hopkins, *A Report on Educational Research, Development and Diffusion Manpower, 1964-1974* (Bloomington: Indiana University Research Foundation, 1969).

14. J. E. Hopkins, *An Updating of the Clark-Hopkins Manpower Projections: AERA Task Force Technical Paper No. 25* (Washington: American Educational Research Association, 1971), p. 3.

education R&D personnel hold at least a secondary membership in AERA. An estimate of about 10,000 persons in the current education R&D work force can be derived from the assumption that the number of education researchers and developers who do not belong to AERA is roughly balanced by the number AERA members who are not active in R&D in education. Table 4.8 presents membership totals of AERA and relevant divisions of APA and ASA.

Employment Data. The education R&D work force can be estimated from employment data reported for education R&D institutions in the *Research Centers Directory* and the *New Centers Directory*.[15] These sources, discussed in Section 4.B., supply employment data for about 90 percent (or about 450) of the 500 education R&D institutions listed. A total of about 9,150 employees is reported, of which 5,350 are identified as "professionals conducting or supporting research activities." (Graduate students training for careers in and working in R&D institutions are defined as professionals.) Technicians number 950; "others" and "staff not differentiated by task" number 2,850.

Authorship of R&D Literature. Authorship of technical reports and other documents accessioned by ERIC provides a useful cross section of education R&D activity. Although not all education researchers and developers are represented in ERIC and not all ERIC holdings relate to R&D, the number of different authors represented in ERIC is the basis of an estimate of the education R&D work force with an assumption similar to that used with respect to AERA membership—that the number of persons who should not have been included is balanced by the number of persons who should not have been excluded.

Degrees Awarded. The pool of potential (if not actual) education R&D personnel has grown rapidly in the past two decades, increasing each year by unknown numbers of doctorates awarded in education and the social sciences. Not all of these become education R&D personnel; on the other hand, small numbers of specialists from a variety of fields (e.g., medicine, engineering) temporarily enter the education R&D work force under varying circumstances.

Except for doctorates in education, the extent to which the education R&D work force is augmented by new degreeholders is difficult to estimate. Hendrik Gideonse, in 1969, used the rule of thumb that 10 percent of all holders of doctorates in education are likely to enter education R&D. The proportion of psychology doctorate holders becoming active in this area may be higher; whereas for sociologists and other social scientists, it is probably lower.

Table 4.9 shows the relative numbers of education, psychology, and sociology doctorates awarded in 1955, 1967, and 1973. Applying Gideonse's 10 percent rule for education doctorates, augmentation of the education R&D work force from that source in 1973 was about 700 persons. Also in 1973, slightly more than 200 of the 2,440 persons earning doctorates in psychology were trained in the specialties of educational psychology and school psychology. The specialties of developmental, experimental, psychometric, and social psychology (totaling more than 700

15. Palmer, *Research Centers Directory* (1972); Palmer, *New Research Centers Directory* (1972-74).

TABLE 4.8. *Membership in professional associations and divisions related to education R&D: 1973 and 1974*

Association	Division	Year	Membership
American Educational Research Association (AERA)		1974	10,836
American Psychological Association (APA)	Educational Psychology	1973	3,668
	School Psychology		2,453
	Counseling Psychology		2,248
	Evaluation and Measurement		887
American Sociological Association (ASA)	Sociology of Education	1973	861
	Sociology of Knowledge and Science		300
	Sociology of Mass Communication		132

Sources: AERA, APA, ASA, membership rosters, 1974.

TABLE 4.9. *Number of doctorates awarded in education, psychology, and sociology, selected years*

Field	1955	1967	1973
Total	2,240	5,000	10.290
Education	1,440	3,440	7,250
Psychology	630	1,230	2,440
Sociology	170	330	600

Sources: M. Rice and H. Poole, *Earned Degrees Conferred by Higher Educational Institutions, 1955-1956* (Washington: Government Printing Office, 1957); OE, *Educational Research and Development in the United States* (Washington: Government Printing Office, 1969); National Research Council, *Survey of Earned Doctorates* (Washington: Government Printing Office, 1974).

doctorates in 1973) undoubtedly supplied additional education researchers and developers, according to traditional career choices.

The relative contributions of education, psychology, and other specialties to the education R&D work force can also be gauged by examining data on degrees earned by persons already in the work force. (See Table 4.10.)

More detail on the career choices of recipients of doctorates for selected years is shown in Table 4.11. During the 1960's 27,440 education doctorates were awarded (about 17 percent of all awarded); from 1970 to 1973 alone, 26,570 education doctorates were awarded (about 21 percent of all awarded). The percentage of recipients of education doctorates reporting education R&D as their primary work activity climbed from an estimated 5 percent in the early 1960's to a high of 9 percent in 1969, then declined to about 7 percent in the early 1970's.

Data for 1973 indicate that the education R&D work force was augmented by about 850 persons from the field of education alone if each education doctorate reporting "primary R&D" is counted as one full-time equivalent (FTE) and each education doctorate reporting "secondary R&D" is counted as one-third FTE. (The fraction must be less than one-half if characterization as "secondary" is valid.)

TABLE 4.10. *Percentage distribution, by field, of education R&D personnel in selected areas of activities, selected years*

Area of R&D Related Activity	Highest degree earned in: Education	Psychology	Other
National Register of Educational Researchers (1965 data; N = 3,923)	46	44	10
Membership of American Educational Research Association (1968 data; N = 6,610)	75	17	8
Personnel of R&D centers and regional laboratories (1972 data; N = 476)	41	32	27
Personnel of designated exemplary projects (1972 data; N = 122)	41	14	45
Applicants in NIE grants competition, "essential skills" category (1974 data; N = 1473*)	41	33	26

*Data on NIE grants competitions are limited to doctoral level researchers. The other studies include researchers with less than a doctorate.

Sources: Phi Delta Kappa, *National Register of Educational Researchers* (Bloomington, Ind.: PDK, 1966); AERA; NIE.

Mean estimate. Education R&D draws half of its work force from education per se; the field of psychology supplies most of the rest. Not all education researchers and developers remain in the field for their entire careers. Not all devote full time to R&D; some spend much time on administration and/or teaching. Most education researchers and developers are working on topics

TABLE 4.11. *Total numbers of doctorates and education doctorates awarded, and percentage of recipients engaged in education R&D, selected years*

Doctorate Information	1963	1966	1969	1973
Total doctorates	12,720	17,865	25,734	33,727
Education doctorates	2,130	3,026	4,618	7,248
Percentage of total	17	17	18	21
Holders of education doctorates reporting R&D as primary work	est 106	est 151	416	478
Percentage of holders of education doctorates	est 5	est 5	9	7
Education doctorates reporting R&D as secondary work	NA	NA	NA	1,137
Percentage of holders of education doctorates	NA	NA	NA	16

Source: NAS, *Doctorate Recipients from United States Universities* (Washington: NAS, 1974).

that are clearly recognized as part of the education R&D mainstream (for example, improved school practices); others are working on topics now thought to be peripheral (for example, brain chemistry). Many education R&D personnel now working at a professional level entered the work force at a lower level and gained experience on the job without a research degree.

Each of these factors confounds a best estimate of the number of education researchers and developers who are currently active, but probably no fewer than 5,000 are active in the United States, even by a narrow definition. Conversely, even by a broad definition there are probably no more than 15,000. The mean of 10,000 happens to fall between the Hopkins 1974 estimate of 8,669 and the American Educational Research Association 1974 membership total of 10,836. Although a current national survey would help to clarify the number of persons active in the field, a new definition of the work force by role, function, and focus of activity is required for a precise estimate of the "education R&D work force."

Women and Minorities in the Work Force

Equitable participation by women and minorities in education R&D has been a subject of increasing concern in recent years. The only national data available are those for the membership of AERA, shown in Table 4.12.

In 1975, women constituted 28 percent of the AERA membership. The Ad Hoc Committee on the Role and Status of Women summarized the results of a number of studies as follows:

> In sum, among the very limited group in AERA who participate in governance and other association activities, the proportion of women appears to be increasing, if somewhat erratically . . . .
>
> Productivity differences between men and women are slight. Where they reach statistical significance, the strength of the relationships usually is limited.
>
> While participation and productivity rates of men and women show only slight differences, the reward system is clearly differentiated by sex. This is influenced most by level of education and length of time in the work organization. Admittedly, there is a greater proportion of males with doctorates, and more women than men have master's degrees. But even when some do hold the same degree as their male colleagues, their salary differences tend to persist, particularly among Ed.D. holders.
>
> Some very recent gains by women—particularly within the last year—are noted in terms of promotions. And women who are long established in the field (i.e., in the same organization more than 10 years) appear to do as well as men. But women in the less-advanced stages of their professional lives receive lower salaries than men at the same stages
>
> In an oversimplified way, we can answer our original research question by concluding that
>
> 1) the most meaningful demographic differences between female and male respondents is educational level;

TABLE 4.12. *Ethnicity of AERA 1975 membership, by sex, compared to ethnic distribution of 1970 U.S population*

Ethnic group	1975 AERA membership: Male No.	Male %	Female No.	Female %	Both sexes No.	Both sexes %	Proportion in U.S. 1970 population %
Total	5,946	100.0	2,462	100.0	*8,646	100.0	100.0
White	5,377	90.4	2,195	89.2	7,773	89.9	82.4
Black	141	2.4	90	3.7	241	2.8	11.1
Oriental	146	2.5	64	2.6	221	2.6	.8
Hispanic	58	1.0	31	1.3	94	1.1	5.0
Native American	33	.6	15	.6	49	.5	.4
Other	191	3.2	67	2.7	268	3.1	.3

*Specific sex of 238 persons was not reported.

Sources: *Educational Researcher,* January 1976; AERA, unpublished data; U.S. Bureau of the Census (1970).

2) participation and productivity differences are slight; but

3) reward differentials between the sexes are substantial.[16]

The same data base indicates that only those minorities of Oriental extraction participate in education R&D in the same proportion as or greater proportion than their representation in the total population.

Personnel in State Education Agencies

Data collected in 1970 by Henry Brickell[17] indicated that 417 R&D personnel were employed in State departments of education. Only four States—Georgia, New York, Pennsylvania, and South Carolina—reported 20 or more R&D personnel. Ten other States reported 10 or more R&D personnel.

Other reports of R&D personnel in State departments of education bracket Brickell's estimate. For example, the 1971 OE publication, *Education Directory: State Governments,* lists about 730 persons whose positions imply R&D activity. The difference of more than 300 persons in the two estimates may arise from Brickell's customary use of a single informant in each State department of education and/or from the minimal job information in the *Education Directory.*

The most substantial source of data on education R&D personnel in State departments of education is NSF's *Research and Development in State Government Agencies,* although the survey's intent is to report expenditure rather than manpower data. Conducted at intervals from 1965 to 1973, this survey covers all fields of R&D and distinguishes between scientists/engineers and technicians.

In 1964, NSF reported full-time equivalent totals of 2,721 scientists/engineers and 1,784 technicians in State agencies (not exclusively in departments of education). Of these, 56 scientists/engineers and 42 technicians were engaged in education R&D. The corresponding 1968 totals were 3,733 scientists/engineers and 2,869 technicians, with education R&D subtotals of 369 and 124, respectively. The 1973 totals were 4,899 scientists/engineers and 3,308 technicians; the education R&D subtotals were 206 and 29. Whereas the ratio of all scientists/engineers to all technicians has remained close to 6:4 from 1964 to 1973, in education R&D the ratio has shifted from 6:4 to nearly 9:1. Although exact comparisons between education and other fields cannot be made, the data suggest a better trained education R&D work force in the 1970's than in the 1960's. Aggregating scientists/engineers and technicians, the total number of State agency personnel engaged in education R&D rose from 98 in 1964 to 493 in 1968, then declined to 235 in 1973.

The NSF data further show that nine States have 10 or more State agency personnel engaged in R&D in education. Totaling scientists/engineers and technicians, Hawaii leads the Nation with 33 persons, followed by Pennsylvania with 32. Other States in this group are California (27), Kentucky (17), Oklahoma (14), Illinois (13), Massachusetts (13), New York (10), and Georgia (10).

NSF discusses the data on State agency personnel in these terms:

> Education at first glance presents a paradox. It was the third largest (State agency R&D) function in 1973, but it accounted for only 4 percent of the FTE scientists/engineers and technicians engaged in R&D undertakings. The explanation is that most State-supported R&D work in education is not performed by State personnel but by personnel of local governments.[18]

Personnel in Local Education Agencies

No enumeration exists of the "personnel of local governments" mentioned in the NSF report. Relative proportions of State and local funding for education R&D performed under the auspices of school districts vary among States and categories of education programs. No data are presently available on these proportions.

16. Jean Lipman-Blumen, Patricia E. Stivers, Ann R. Tickamyer, and Suzanne Brainard, "Participation of Women in the Educational Research Community" (Paper prepared for presentation at Annual Meeting of the American Educational Research Association, Washington, D.C., 1975).

17. Brickell, *Survey of State Education Department RDDDE* (1971).

18. NSF, *Research and Development in State Government Agencies* (Washington: Government Printing Office, 1975), p. 25.

Some lists of district-level education R&D personnel are maintained by the Curriculum Information Center, a commercial data source in Denver. According to these lists, about 1,230 "district-level administrators" have R&D functions, apart from the 6,350 district-level administrators who have testing functions. Both estimates should be judged in the context of approximately 16,000 school districts now operating.

According to the Curriculum Information Center lists, six States have more than 50 district-level personnel in education R&D: California (172), New York (107), Michigan (88), Ohio (73), Texas (69), and Pennsylvania (55).

Training

The two programs described here are representative of Federal and other efforts to improve the quality of education R&D through training of R&D personnel prior to and during their service.

Beginning in 1966, the Cooperative Research Act supported about 700 traineeships per year for students in more than 100 different graduate training programs. Each year from 1968 through 1973, about 250 students were graduated from these programs, most of them with doctorates. The programs included on-the-job training in university research units as well as in State and local education agencies and at other off-campus sites.

Approximately one-third of the graduates of the traineeship program entered full-time research; another third entered part-time research, usually in college faculty positions; the rest are in non-research positions. Of the latter group, most assumed administrative or teaching responsibilities without immediate opportunity for research. The long-term traineeship program has contributed about 1,000 persons to the education R&D work force since its inception in 1966.

Appropriations for the long-term training program from FY 1966 to FY 1971, with some reduced funding in FY 1972, totaled about $28 million. In addition, about 10,000 persons received short-term training during the same period at a cost of approximately $12 million, bringing the total training funds to $40 million.

D. R&D PRODUCTS

R&D in education produces new knowledge concerning the educational process, generally in the form of reports and new products that can be used to improve education.

Some knowledge acquired about educational processes overlaps with knowledge that has long been acquired and valued in such disciplines as psychology and sociology. Learning processes, the structure of intellect, schedules and contingencies of reinforcement, attitude formation and change, interpersonal and mediated communication, group processes, goal setting, and decision making are only a few interests among hundreds that education researchers share with their colleagues in psychology and sociology. Further parallels with the research of the disciplines are found in analyses of the economics of education and of its demographic and political characteristics.

New products for teachers, administrators, and other education personnel are more specifically the contribution of education R&D. A technology of development in education has emerged in the past two decades. Most developers, in carrying out a sequence of steps from conceptual analysis of the educational problem, through testing of alternative solutions, to field validation of the resulting product, are using methods not shared by their colleagues in disciplinary research. The education developer shares the social scientist's concern for human though and behavior, but the developer's methods are more nearly those of the engineer.

As noted in Chapter 3, the most discussed new educational products two decades ago were machines. After a period of installation and testing, it became clear that machines were valueless without provocative and valid content, and the focus shifted to curriculum. A decade ago, the science curriculum reform efforts of the NSF–Chemical Education Materials Study, Physical Sciences Study Committee, Biological Sciences Curriculum Study, and School Mathematics Study Group–were coming to fruition. By the end of the 1960's, several million students had used these new science curriculums including more than 3 million users of BSCS alone.[19]

19. OE, *Educational R&D in U.S.* (1969).

"Exemplary" Products

Several reviews and compendiums of new educational products have appeared in recent years.[20] In two of these, 30 "exemplary" products are discussed at length. The products and their developers are listed in Table 4.13 along with notes on product use. (Chapter 6 contains a more detailed discussion of product utilization.)

It is noteworthy that diverse R&D organizations are responsible for the 30 "exemplary" products. Universities and nonprofit organizations each produced 11 of the products; for-profit organizations, 6; and government agencies, 2.

20. Council for Educational Development and Research, *CEDaR Catalog of Selected Educational Research and Development Programs and Products* (Denver: CEDaR, 1972); S. N. Henrie, ed., *ALERT: A Sourcebook of Elementary Curricula Programs and Projects* (San Francisco: Far West Laboratory for Educational Research and Development, 1972); D. W. Kratochvil et al., *Product Development Reports* (Palo Alto, Calif.: American Institutes for Research, 1971-72); Mortimer Smith, Richard Peck, and George Weber, *A Consumer's Guide to Educational Innovations* (Washington: Council for Basic Education, 1972); B. J. Turnbull et al., *Promoting Change in Schools: A Diffusion Casebook* (San Francisco: Far West Laboratory for Educational Research and Development, 1974).

NIE-Sponsored Products

In 1975, NIE surveyed current and former contractors and grantees for information on the results of their work and its impact on educational policy, research, and practice. Data were collected on R&D products, evidence of effects, and dissemination status. Products included within the scope of the study were curriculum materials; training materials; and measurement instruments, models, and guides. Research reports and planning documents were excluded. As a result of the survey, information on 776 NIE-sponsored products was tabulated. The findings are noted below.

Origins. The largest proportion of products (38 percent) originated in the educational laboratories. ERIC clearinghouses were responsible for 26 percent; R&D centers for 23 percent; and all other contractors and grantees, 13 percent.

Subject Areas. Of the 776 products, 661 were selected for inclusion in the *Catalog of NIE*

TABLE 4.13. *Recent "exemplary" products of education R&D, their developers, and their utilization histories*

Exemplary Product*	Developer	Utilization history
Arithmetic Proficiency Training Program (computer-assisted instruction to supplement elementary arithmetic)	Science Research Associates (division of IBM), Chicago, Ill.	About 100 terminals in distant locations.
Cluster Concept Program (vocational training for high school juniors and seniors)	University of Maryland, College Park, Md.	Initially used, then discontinued, by State of Maryland. Other States are now considering it.
Creative Learning Group Drug Education Program (multimedia materials on drug use and abuse for elementary and junior high students)	Creative Learning Group (division of Media Engineering Corporation), Cambridge, Mass.	250 kits had been sold by 1971 and 7,500 students reached.
Developmental Economic Education Program (curriculum for the development of "economic literacy" among elementary and secondary students)	Joint Council on Economic Education, New York, N.Y.	At least 7 million students in 150 school districts have been involved with the program.
Distar Instructional System (curriculum in reading, language, arithmetic, and related subjects for preschool and early elementary grades)	University of Oregon, Eugene, Oreg.	It is estimated that 300,000 students in 3,000 schools are using Distar.
Drug Decision Program (multimedia materials for students in grades 6-8)	Lockheed Educational Systems, Sunnyvale, Calif.	More than 250 school districts have purchased the DDP. More than 400,000 students may have used it.

TABLE 4.13. *Recent "exemplary" products of education R&D, their developers, and their utilization histories*—Continued

Exemplary Products*	Developer	Utilization history
Edison Responsive Environment Learning System, or the Talking Typewriter (computerized typewriter with audiovisual capabilities, primarily for reading instruction)	Thomas A. Edison Laboratory (division of McGraw Edison Corporation), Englewood Cliffs, N.J.	At least 150 typewriters are installed in 50 centers in the United States and Israel.
Educational Television for Preschoolers: Sesame Street (nationwide public broadcast for home and school viewing by preschool and kindergarten children)	Children's Television Workshop, New York, N.Y.	It is estimated that Sesame Street reaches 90 to 95 percent of its potential young audience.
Facilitating Inquiry in the Classroom (in-service teacher training to stimulate students in self-directed inquiry)	Northwest Regional Educational Laboratory, Portland, Oreg.	Several thousand teachers have participated in workshops. About a dozen colleges and universities have also adopted the materials.
Frostig Program for Perceptual-Motor Development (enhances perceptual-motor abilities in kindergarten through grade 3)	Marianne Frostig Center of Educational Therapy, Los Angeles, Calif.	Materials sales up to 1970 were 750,000 units. At that time, 200,000 students had been involved.
Hawaii English Program (presents the English language as a set of skills, a system of communication, and a medium of art; covers all elementary and secondary grades)	Hawaii State Department of Education (in cooperation with the University of Hawaii), Honolulu, Hawaii	Installed throughout Hawaii.
Holt Social Studies Curriculum (stresses inquiry approach to the study of history and social science in the secondary grades)	Carnegie-Mellon University, New York, N.Y.	The publisher has been selling about $1 million of the HSSC materials per year.
Individually Prescribed Instruction—Mathematics (sequence and pace of elementary mathematics are determined by abilities and interests of individual students)	Learning R&D Center and Research for Better Schools, Pittsburgh and Philadelphia, Pa.	Installed in more than 300 schools.
Inquiry Development Program in Physical Science (curriculum for grades 6-9 that features "discrepant events" to challenge student inquiry)	Science Research Associates (division of IBM), Chicago, Ill.	Projecting usage from sales, the IDP may have been used by 100,000 to 500,000 students.
Intermediate Science Curriculum study, or Probing the Natural World (junior high curriculum that focuses on both science content and process)	Florida State University, Tallahassee, Fla.	200,000 or more students in all States of the country are using ISCS.
Kindergarten Program, or First Year Communication Skills Program (teaches basic skills of English language communication)	Southwest Regional Laboratory for Educational Research and Development, Los Alamitos, Calif.	About 250,000 students have used these materials.
Man: a Course of Study (social science curriculum for grades 5-7)	Education Development Center, Cambridge, Mass.	Used by least 200,000 students.

TABLE 4.13. *Recent "exemplary" products of education R&D, their developers, and their utilization histories*—Continued

Exemplary Product*	Developer	Utilization history
Materials and Activities for Teachers and Children, or MATCH Units (elementary program to aid skills development through experience with actual materials)	Children's Museum, Boston, Mass.	More than 200 copies of each unit have been sold throughout the United States. Each year, about 700 classes borrow MATCH from the Children's Museum in Boston.
Minicourses (multimedia system for in-service teacher training, emphasizing feedback and self-criticism via videotape)	Far West Laboratory for Educational Research and Development, San Francisco, Calif.	More than 1,000 Minicourses have been sold or rented. Publisher's receipts exceed $900,000.
Multi-Unit School/Individually Guided Education (an organizational system that replaces traditional self-contained classrooms with larger nongraded units)	R&D Center on Cognitive Learning, Madison, Wis.	More than 1,000 elementary schools have implemented IGE.
New School of Behavioral Studies in Education (alternative mode of teacher education for practicing teachers with less than BA degree)	University of North Dakota, Grand Forks, N. Dak.	Teachers from 75 schools participated in the project. About 700 degrees were conferred.
Parent/Child Toy Lending Library (concept-teaching toys to be used jointly by 3- to 4-year-old children and their parents)	Far West Laboratory for Educational Research and Development, San Francisco, Calif.	At least 73 Toy Libraries exist, but there may be more since the materials are easily copied; 1,300 librarian manuals have been sold.
Research Utilizing Problem Solving (provides teachers and administrators with skills to analyze situations, consider alternatives, and make decisions)	Northwest Regional Educational Laboratory, Portland, Oreg.	It is estimated that more than 100,000 teachers/administrators have used RUPS.
Science—A Process Approach (teaches elementary school science through processes of observing, measuring, classifying, predicting, inferring, etc.)	American Association for the Advancement of Science, Washington, D.C.	It is estimated that students taught with these materials number in the millions.
Science Curriculum Improvement Study (emphasizes "scientific literacy" in elementary school science through a framework of fundamental concepts)	University of California, Berkeley, Calif.	More than 1 million students in almost all States have used SCIS.
Simulation Games (classroom games teaching vocational, economic, political and other concepts)	R&D Center on Social Organization of Schools, Baltimore, Md.	More than 30,000 games have been purchased.
Sullivan Reading Program (basic reading materials in programed format)	Sullivan Associates, Menlo Park, Calif.	More than 5 million children are using Sullivan reading materials.
Taba Social Studies Curriculum (approaches elementary school social studies through the development of thinking skills, attitudes and values, etc.)	San Francisco State University, San Francisco, Calif.	Yearly sales average 25,000 guides.
Technology for Children—T4C (combines "hands-on" career education with traditional elementary school subjects)	New Jersey State Department of Education, Trenton, N.J.	About 2,000 teachers and 50,000 students had been involved in the program by 1973.

TABLE 4.13. *Recent "exemplary" products of education R&D, their developers, and their utilization histories*—Continued

Exemplary Products	Developer	Utilization history
Variable Modular Scheduling via Computer (system for allocating a school's resources—personnel, facilities, and time—according to the school's overall purposes)	Stanford University and Education Coordinates, Palo Alto and Sunnyvale, Calif.	Used in perhaps 250 schools.

*These are the 30 recent products reported in the sources below. Descriptions are meant only to characterize, not to define or distinguish the products. Space does not permit mentioning the many publishers and school systems that participated in later phases of development. Utilization histories are generally out of date; the extent of use is therefore underestimated.

Sources: D.W. Kratochvil et al., *Product Development Reports* (Palo Alto, Calif.: American Institutes for Research, 1972); B.J. Turnbull et al., *Promoting Change in Schools: A Diffusion Casebook* (San Francisco: Far West Laboratory for Educational Research and Development, 1974).

Education Products.[21] The primary subject areas of the 661 products are shown in Table 4.14. Nearly 100 products fall in each of two subject areas: basic skills, and education and work.

Product Formats. Nearly half (381) of the 776 products could be classified in the following single-product formats: catalogs, guidelines, handbooks, manuals (44 percent of the 381); administrator/teacher training materials (32 percent); curriculum materials (18 percent); tests and measurement instruments (5 percent); replicable models (1 percent). Format data were not obtained on some of the remaining 395 products; while others were product "packages" that combined such things as curriculum materials, administrator/teacher training materials, and tests.

Evaluation Status. Data were obtained on the evaluation of 498 products. For 63 percent of these, "small-scale controlled tests of effectiveness" had been completed. For 78 percent (including many of the same products), "small-scale field tests of practicability, transportability, or replicability" had been completed. "Large-scale

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

TABLE 4.14. *Primary subject areas of 661 NIE-sponsored products: 1975*

Primary subject area	Number	Percent
Total	661	100
Aesthetic education	44	7
Basic skills	98	15
Mathematics/science	39	6
Reading/language arts	41	6
Reasoning	18	3
Early childhood	69	10
Education and work	98	15
Administration	29	4
Career awareness	27	4
Career counseling	32	5
Experience-based	10	2
Educational equity	82	12
Handicapped	14	2
Multicultural/bilingual	59	9
Sex fairness	9	1
Evaluation, measurement, needs assessment	44	7
Finance, productivity, management	54	8
Guidance, counseling	11	2
Information dissemination and utilization	24	4
Postsecondary education	31	5
Social education	21	3
Social sciences	17	3
Teacher education	68	10

Source: NIE, *Catalog of NIE Education Products* (Washington: NIE, 1976).

replications" had been completed for 42 percent; "follow-up studies of impact," for 13 percent; and "marketing or feasibility studies," for 36 percent.

Origins and Subject Areas of Research Articles. Persell[22] analyzed 1,110 research articles in education published during 1969 in 113 journals or read at the AERA convention. Table 4.15 shows that 84 percent of the 1,110 articles were written in academic settings. About half of these originated in a school or department of education—fewer than might be expected, since 66 percent of the authors' doctorates were in education.

Table 4.16 shows the primary subject areas of the articles. The areas indicate several historical and current facts about education, including the influence of the psychological perspective; practical concerns for curriculum and teacher training; and the recent emphasis given to research on higher education.

22. Carolyn Persell, *The Quality of Research on Education: An Empirical Study of Researchers and their Work* (New York: Columbia University, Bureau of Applied Social Research, 1971).

TABLE 4.15. *Origins of 1,110 research articles: 1969*

Origin	Percent of total
University	75
College	9
School system	7
Private agency	5
Government agency	1
State department of education	0.5
Other (hospital, business, etc.)	3

Source: C. Persell, *The Quality of Research on Education* (New York: Columbia University, Bureau of Applied Social Research, 1971).

TABLE 4.16. *Subject areas of 1,110 research articles: 1969*

Subject area	Percent of Total
Psychological processes	19
Curriculum	18
Higher education	12
Personnel and teacher training	11
Guidance and counseling	10
Research methods	9
Social context	8
Reading	5
Special education	3
Administration	2
Speech	2
Other	1

Source: C. Persell, *The Quality of Research on Education* (New York: Columbia University, Bureau of Applied Social Research, 1971).

CHAPTER 5
DISSEMINATION OF EDUCATION R&D PRODUCTS AND INFORMATION

A. BACKGROUND FACTORS

Early dissemination programs were in response to pressure from both R&D personnel and instructional and administrative staffs. R&D personnel long had tolerated marginal status in the dissemination programs of the fields of psychology, sociology, economics, and statistics. Education R&D articles were poorly indexed in the terminology of the disciplines and many less formal reports, characteristic of education R&D, were lost from any archive. The dissatisfaction of R&D personnel strongly influenced the timing and the structure of the Educational Research Information Center (ERIC) in 1965.

Earlier needs felt by instructional and administrative staffs had produced solutions of a different kind. In school districts during the 1930's and 1940's, efforts to test and install new practices led to a desire for broader resources and experience. Districts began to join together in consortiums called "school study councils." Paul Mort, a tireless educational reformer, founded the first formal school study council in 1942 around his own institution, Columbia University Teachers College. The original 28-district Metropolitan School Study Council remains active today. According to the National School Development Council, 70 school study councils are presently operating, ranging from one nationwide consortium (the Associated Public School System) to many regional consortiums (for example, the Western New York School Study Council).

As Federal expenditures for educational renewal and reform climbed from almost nothing in 1956 to more than $100 million in 1966, it was clear that a more systematic Federal plan for dissemination was needed to supplant the sporadic dissemination efforts that were tied to individual programs such as title VII-B of the National Defense Education Act. After studies for a Federal education R&D dissemination system had been funded from title VII-B, in 1965 OE launched ERIC, which was first designated Educational Research Information Center and was later renamed Educational Resources Information Center.

Dissemination systems like the school study councils and ERIC are more aptly called "linkage" systems because they do not fit the dissemination model of outward diffusion from a central source. Long-established linkage systems in education R&D include both the conventions and journals of professional associations, commercial publishing, foundation programs such as the Ford Foundation's school improvement activities, and State department of education programs.

In an ongoing study[1] of educational linkage systems, linkage is defined as communication activity that:

Brings new educational practices, especially those resulting from systematic R&D, to the attention of educators (instructional and administrative staff);

Provides educators with technical assistance in the evaluation, trial, adoption, and maintenance of new practices;

Provides educators with new competencies (as required by new practices) through continuing education; and

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1. M. Butler-Paisley and W. Paisley, *Communication for Change in Education: Educational Linkage Programs in the 1970's* (Stanford, California: Stanford University, Institute for Communication Research, 1975).

Provides a feedback loop from educators back to researchers, developers, and policymakers.

The linkage systems examined in this chapter meet these criteria in a variety of ways.

R&D Journals

Traditionally, the journals of a research field are its first line of dissemination or linkage. *Nature* and the *Physical Review* are examples of journals that are institutions in their own right. Closer to the field of education, a journal like the *Psychological Bulletin* is considered to be definitive in its treatment of a topic. Such strong journals have coalescing effects on their disciplines. Education R&D, however, does not have a similarly strong journal of its own.

The *North American Educator's World* lists 2,000 journals and magazines that deal with education. Only a handful of these publish research reports. Table 5.1 identifies some of the better-known journals that publish the results of education R&D and shows their circulations.

R&D Conventions

Education R&D topics appear on the programs of various disciplinary conventions, notably those of the American Psychological Association, the American Sociological Association, and the various education associations. The American Educational Research Association (AERA) presents the greatest annual concentration of education R&D topics to a convention audience that in 1974 reached 4,800 including 1,800 participants in 400 symposiums and reporting sessions.

A study of the 1974 AERA convention shows that college and university participants dominated the proceedings.[2] In contrast to 1,813 participation events on the 1974 program attributable to colleges and universities, 279 were attributable to private corporations, 169 to school systems, and 162 to Government agencies. (Participation events exceed the number of participants because some participants appeared in more than one session.) Institutions accounting for the largest number of participation events are shown in Table 5.2

2. Harold J. Fletcher, Charles A. Beagles, Harry T. Dodd, and Terry M. Wildman, "Institutional Participation in the 1974 AERA Annual Meeting," *Educational Researcher* (July-August 1974), pp. 8-10.

TABLE 5.1. *Circulation of selected publications concerned with education R&D: 1970 and later*

Publication	Circulation
American Educational Research Journal	12,500
Adult Education	7,000
Audiovisual Instruction	20,000
AV Communication Review	7,800
California Journal of Educational Research	1,400
Child Development	5,000
Educational Researcher	11,500
Educational Technology	12,000
Educational Television Magazine	15,000
Exceptional Children	40,000
Harvard Educational Review	14,900
Journal of Educational Measurement	2,700
Journal of Educational Psychology	8,400
Journal of Educational Research	6,000
Journal of Experimental Education	2,000
Journal of Learning Disabilities	13,900
Journal of Negro Education	3,000
Journal of R&D in Education	5,000
Journal of Research in Mathematics Education	5,100
Journal of Reading	13,000
Mathematical Reviews	5,100
Reading Research Quarterly	6,800
Research in Music Education Journal	8,500
Research Quarterly of the American Association for Health, Physical Education and Recreation	16,000
Research Relating to Children	6,000
Review of Educational Research	13,200
Sociology of Education	3,000
Theory into Practice	5,700
Urban Review	9,000

Sources: *Ayer Directory of Periodicals* (Philadelphia: Ayer Press, 1974); *North American Educator's World* (Philadelphia: North American Publishing, 1972); *Standard Periodical Directory* (New York: Oxbridge Publishing, 1973).

B. FEDERAL NETWORK

The Education Resources Information Center (ERIC)

ERIC represents a major Federal dissemination effort. The Federal Government has been supporting ERIC at a level of about $3 to $5 million annually. (See Table 4.5 in Chapter 4.) ERIC currently consists of a centralized document processing facility and reproduction service together with 16 decentralized clearinghouses. Over the years, ERIC clearinghouses have undergone some consolidation. Several of the present clearinghouses are composites of formerly separate clearinghouses located in different parts of the United States.

TABLE 5.2. *Institutions involved in 25 or more participation events on the program, 1974 AERA convention*

Institution	Number of events
University of Pittsburgh	59
Stanford University	56
University of Wisconsin	54
University of California at Los Angeles	53
National Institute of Education	51
Columbia University	44
Pennsylvania State University	43
Michigan State University	43
University of Texas	40
University of Minnesota	38
University of Illinois	38
University of Chicago	35
Florida State University	30
Ohio State University	30
University of California at Berkeley	30
Southwestern Regional Laboratory (SWRL)	29
University of Indiana	28
University of Florida	27
Ontario Institute for Studies in Education	26
Educational Testing Service	25
Research for Better Schools	25
University of Virginia	25

Source: H.J. Fletcher et al., "Institutional Participation in the 1974 AERA Annual Meeting," *Educational Researcher* (July-August 1974).

An impressive amount of educational literature has been brought under bibliographic control, been reviewed and synthesized, and made readily available to researchers and educators. Table 5.3 shows the rapid growth of ERIC's files since 1967.

The character of the ERIC data base can be inferred from the topic headings under which it is organized. Table 5.4 shows that the most-used topic headings (those with more than 1,000 postings) can be grouped in eight global categories: curriculum, teachers, students, subject matter of instruction, levels of education, planning, finance, and research. The postings also indicate the impressive depth of ERIC's documentary resources as of 1973, 8 years after the inception of the ERIC system and only 5 years after ERIC accessioned its ten-thousandth report.

Dissemination of NIE-sponsored Products

The NIE-sponsored products described in Section 4. D. are in various stages of formal testing and dissemination. Publishing arrangements are reported for 208 products. Publication contracts had been signed for 37 percent of the products, and contracts were being negotiated for 10 percent. Publishers were being sought for an additional 40 percent. For 5 percent of the products, publication search had been abandoned as unsuccessful. Eight percent of the products were special cases not covered by the foregoing categories.

TABLE 5.3. *Journal articles cited in* Current Index to Journals in Education* *and documents cited in* Research in Education: *1967-74*

Year	Cumulative total report literature	Cumulative total journal articles
1967	2,300	...
1968	11,100	...
1969	21,600	11,700
1970	32,100	27,600
1971	44,400	45,300
1972	56,600	62,800
1973	70,800	82,200
1974	84,900	102,000

**Current Index to Journals in Education* began publication in 1969.

Source: NIE.

Availability to educators was reported for 487 products. The largest proportion (148 products or 31 percent) was on the market in final form—available either from the developer or a commercial publisher. Another 12 percent was available for limited distribution in final form from the developer. Interim versions of 22 percent were available from the developer. ERIC was a source for the final form of 7 percent. The remaining 28 percent was not covered by the foregoing categories.

NIE's Copyright Approval and Publishers' Alert Programs

NIE currently administers an activity known as the Copyright Approval Program. The program authorizes developers to claim copyright for materials developed under project grants and contracts in certain situations in order to achieve effective dissemination of appropriate materials. [Education Division agencies served by the Copyright Approval Program are the OE, NIE, the National Center for Educational Statistics (NCES), and the Fund for the Improvement of Postsecondary Education (FIPSE).] Superseding the "public domain" policy of 1965, the program

TABLE 5.4. *Topics under which 1,000 or more reports have been accessioned by ERIC: 1956-73**

CURRICULUM, MATERIALS, AND AIDS:	Instructional materials (4,722), Curriculum development (3,268), Curriculum guides (2,097), Curriculum (1,697), Audiovisual aids (1,493), Resource materials (1,134), Behavioral objectives (1,073).
TEACHERS, TEACHER CHARACTERISTICS, AND TEACHING:	Teacher education (3,744), Teaching methods (3,082), Teaching guides (2,023), Teaching techniques (2,021), Teacher behavior (1,602), Teacher attitudes (1,572), Inservice teacher education (1,407), Instruction (1,122).
STUDENTS, STUDENT CHARACTERISTICS, AND LEARNING:	Disadvantaged youth (2,617), Academic achievement (2,264), Student attitudes (1,767), College students (1,517), Elementary school students (1,278), Self-concept (1,250), Exceptional child education (1,212), Culturally disadvantaged (1,100), Preschool children (1,066). Learning processes (1,046), Student characteristics (1,028), Language development (1,014).
SUBJECT MATTER OF INSTRUCTION:	Vocational education (2,987), Language instruction (2,679), English instruction (1,648), Reading instruction (1,237), Social studies (1.226), Second language learning (1,191), English as a second language (1,144), Technical education (1,057), Grammar (1,036), Modern languages (1,034).
LEVELS OF EDUCATION:	Higher education (4,199), Junior colleges (2,516), Secondary education (1,856), Adult education (1,319), Elementary education (1,165), Secondary grades (1,075), Elementary grades (1,074), Secondary schools (1,039).
EDUCATIONAL PLANNING:	Educational objectives (2,479), Educational programs (2,010), Educational needs (1,781), Program development (1,558), Educational planning (1,530), Federal programs (1,510), Program planning (1,443), Educational innovation (1,219), Educational change (1,195), State programs (1,173), Decisionmaking (1,118).
EDUCATIONAL FINANCE:	Educational finance (1,501), Financial support (1,275), Federal aid (1,017).
RESEARCH, TESTING, AND EVALUATION:	Program evaluation (4,167), Educational research (2,586), Research (2,220), Evaluation (2,032), Models (1,852), Comparative analysis (1,722), Surveys (1,524), Data tables (1,452), Statistical data (1,376), Statistical analysis (1,179), Research methodology (1,167), Testing (1,139), Evaluation criteria (1,122), Evaluation techniques (1,044).

*Although ERIC was not established until 1965, OE reports from 1956 to 1965 were accessioned as an "historical file."

NOTE.–Parenthetical figures indicate the number of ERIC reports accessioned under this topic. Double-counting occurs to the extent that reports are accessioned under multiple topics.

Source: NIE, *ERIC Descriptor Usage Report* (New York: CCM Information Corp., 1973).

began in 1968 to authorize the claiming of copyright for two purposes:

1. To protect materials during field testing. The intent is to prevent untested materials from being released prematurely to the public.
2. To facilitate commercial marketing of appropriate materials after development and testing are completed. Publishers who undertake publication of such products are required to use their own resources. Inasmuch as it is unreasonable to expect a publisher to make an investment without any protection, the claiming of copyright is authorized. The developer of the materials is normally expected to seek a publisher by competitive procedure and to enter into a publishing arrangement with the selected publisher. Copyright is normally held in the name of the development contractor or grantee organization, which is permitted to retain 50 percent of copyright royalties as compensation for its efforts in securing a publisher. The other 50 percent goes to the U.S. Government. Copyright is authorized for a limited period, generally 5 years. At the end of that time the material enters the public domain.

During the 7 years of the program's operation, more than 550 authorizations have been made to claim copyrights.

A Publishers' Alert Service was established in 1972 to announce to the publishing industry the availability of materials developed under grants and contracts. In the past 3 years, more than 400 publishers have received 97 "Publishers' Alerts"–brochures prepared by an NIE contractor. Most "Publishers' Alerts" thus far have dealt with instructional materials for preschool, elementary, and secondary students. About one-fourth of the materials has been intended for administrator/teacher training and about one-eighth for the improvement of education R&D itself. The service was suspended in January 1976 pending a study of viable alternatives.

C. PROGRAMS IN STATE DEPARTMENTS OF EDUCATION

By statute and custom, many of the activities of a State department of education involve demonstration, dissemination, and coordination. Titles of State departments of education personnel, as listed in the OE publication, *Education Directory: State Governments*, confirm the emphasis on these activities.[3]

Under Federal sponsorship begun in 1970 by OE's National Center for Educational Communication, and continued in 1972 by NIE, several State departments of education initiated or increased R&D dissemination services. Oregon, South Carolina, and Utah first participated in this program, followed by Florida, Iowa, Kansas, Massachusetts, Rhode Island, and Texas. Each of the States developed a somewhat different dissemination program, according to historically different patterns of collaboration with local school systems. Evaluation of the experience of Oregon, South Carolina, and Utah by Sam Sieber and his associates[4] showed the viability of each program.

Although dissemination programs exist in all 50 State departments of education as well as in the District of Columbia and U.S. territories, data are lacking on the funding, staffing, and administrative arrangements of most. It can be said only that the programs take place within the overall State department of education structures. Table 5.5, which lists the administrative expenditures and staff sizes of departments in selected States, covers time points before and after the implementation of title V of the ESEA of 1965. The latter was designed to strengthen State departments of education in dissemination as well as in other roles.

In 1975 NIE inaugurated a State Dissemination Capacity Building Program which is expected to extend to all States eventually. (See under R&D Support Programs of Selected Federal Agencies in Section 3.C.) In the first year, awards were made to 15 State departments of education. In the abbreviated project descriptions that follow, differences in the dissemination strategies of the States can be seen:

Alaska ($96,000). Design and test a statewide system which identifies user information needs, employs various forms of technology for materials/information distribution, and functionally integrates all instructional resources available for State use.

Connecticut ($85,000). Strengthen program development process at local level by establishing a central information storage-retrieval unit and linkage to Local Education Agencies (LEA's) via cooperation of the State Education Agency (SEA) and six area educational centers.

Delaware ($100,000). Apply information and manpower resources to resolve local instructional problems through coordination of

3. Chapter 4 contains estimates of the number of persons in State departments of education who are involved R&D. These estimates seem relatively low when tested against information known about the State department of education.

4. Sam D. Sieber, Daren S. Louis, and Loya Metzger, *Evaluation of Pilot State Dissemination Programs* (New York: Columbia University, Bureau of Applied Social Research, 1972).

TABLE 5.5. *Selected State department of education administrative expenditures* and staff sizes: 1965 and 1970*

State	Expenditures (millions)		Staff size	
	1965	1970	1965	1970
Total, United States	$138.9	$297.8	14,720	21,697
Colorado	1.4	3.1	132	203
Kansas	.8	2.6	92	195
Kentucky	2.7	5.3	399	516
Maryland	1.6	6.2	132	377
Massachusetts	5.8	7.2	574	603
New York	18.9	35.5	1,778	2,467
South Carolina	.9	7.1	166	448
Tennessee	2.9	5.5	349	426
Texas	3.5	8.1	est 500	831

*Excludes expenditures for operation of schools.

Source: J.T. Murphy, *Grease the Squeaky Wheel* (Cambridge, Mass.: Harvard University, Center for Educational Policy Research, 1973).

existing information resources, establishment of an Information Search and Retrieval Unit, and application of field agent linkers.

Idaho ($25,000). Develop a State plan of dissemination activities, including diffusion of knowledge available in ERIC to be used by LEA's, through services of identified and trained district contacts, preferably librarians, of selected target districts.

Illinois ($110,000). Organize a dissemination system in selected target districts with trained extension agents linking SEA information base and local clients. Program is based on Havelock's view of change as a linking process.

Kansas ($26,000). Expand computer search capability (now limited to SEA information center) to eight regional centers, increasing number of persons with logic writing skills. Anticipate multiplying clientele having access to computerized information retrieval.

Kentucky ($75,000). Establish SEA information request clearinghouse with access to agency resource centers and State library system. Link clearinghouse and LEA's via teams in intermediate regional units. Include information product development and adoption grants program.

Missouri ($25,000). Develop SEA plan for comprehensive information dissemination system by (among other activities) identifying user needs, assessing present dissemination capabilities and innovations/practices characteristics, and upgrading computer software.

Montana ($110,000). Identify information resource needs, develop plans to improve resource base, train selected agency and field staff as information extension agents, develop goal-based planning model as context for curricular examination and improvement. Pilot and assess planning and information-sharing model in selected region.

Nebraska ($30,000). Develop plan for identifying and dealing with educational information needs of the SEA staff, educators, and the public. As part of the process to develop plan, organize and pilot model for use in identifying and setting priorities for educational needs.

New York ($100,000). Determine if SEA can design ERIC-compatible, State-specific data bases for use as complement to ERIC, incorporating locally developed curriculum, State program and human resource information. Develop training package to instruct in use of ERIC and new State data base.

North Carolina ($48,000). Plan information system utilizing SEA and regional service centers through full-time dissemination planner leading task force; stimulate use of new knowledge/practices among LEA's; provide project feedback to State/Federal agencies.

South Carolina ($120,000). Expand current operating capabilities in scope, number of audiences served, and quantity and quality of services offered by SEA to target audiences. Expect ultimate establishment of individual LEA mechanisms to expand and continue network.

Tennessee ($60,000). Provide for dissemination practices which are directed beyond the awareness and interest levels through development of plan utilizing a dissemination director and extension agents—one agent from each of eight districts in the State.

Texas ($106,000). Increase utilization of knowledge from research and development and proven programs-practices, working through the system of linkers already in education service centers. Expanded program will serve approximately half of the State's 2.8 million pupils.

In addition, special purpose grants were awarded to Idaho, Wisconsin, Tennessee, Kansas, Missouri and Nebraska. Each is a 1-year grant to survey dissemination needs, to evaluate program effect, or to plan dissemination development.

D. OTHER PROGRAMS

It is generally acknowledged that the printed and oral components of education R&D's formal communication system have little power to change practices in education in themselves, although they play an important role as researchers' resources and as relatively accessible archives of knowledge. Change in educational practice is more strongly influenced by certain linkage facilities and programs which are sponsored by units like State departments of education and local education agencies, and which provide a variety of services to instructional and administrative staffs.

In an ongoing study of educational linkage systems, more than 40 models of linkage have been identified.[5] These models differ in such aspects as the type of linkage service provided, level of service, sponsorship, and interface with clientele. As Table 5.6 shows, these models of linkage include traditional libraries of teacher-training institutions, school study councils, teacher centers, ERIC clearinghouses, regional education laboratories, and education R&D centers. Examples of four diverse models follow:

Educational Products Information Exchange (EPIE), a national "consumer testing service" located in New York, that reports on educational products;

Research Information Services for Education (RISE), an ERIC-based information service in Pennsylvania that meets local educators' information needs in a variety of ways, from workshops to collection of useful documents;

Teachers' Active Learning Center, a San Francisco-Oakland organization that helps teachers develop more effective and individualized classroom strategies; and

"School News" and *"Educational Profiles"* on KATV and KETS, sponsored by the Arkansas State Department of Education, educational broadcasting for teachers.

Distribution of linkage facilities and programs by State largely parallels the size of each State's instructional staff (the primary clientele). Thus Alaska and Wyoming, with the smallest instructional staffs, have few linkage facilities and programs. California and New York, with the largest instructional staffs, have the most. New York's total of 84 facilities and programs, however, is greater than its instructional staff would indicate; California, with a larger instructional staff, has a total of 59 facilities and programs. Regional concentrations of facilities and programs, such as school study councils in the Great Lakes area and teacher centers in New England, can also be seen in Table 5.6.

5. Butler-Paisley and Paisley, *Communication for Change in Education* (1975).

TABLE 5.6. *Linkage facilities and programs by State relative to instructional staff in elementary and secondary education: selected years*

State	Staff	GIC	SIC	TC	SSC	EL	EC	RL	RDC
Total	**2,308,000**	146	53	208	70	339	16	8	13
Alabama	36,000		2		1	7			
Alaska	4,000	1				1			
Arizona	22,000	1	1		2	2			
Arkansas	21,000		1		1	6			
California	213,000	13	2	9	2	25	2	2	4
Colorado	27,000	3	2	8	1	6	1		1
Connecticut	39,000	1		9	1	5			
Delaware	7,000			1	1	1			
District of Columbia	8,000	4	3	7	1	4	2		
Florida	72,000	4	1	4	2	8			
Georgia	46,000	3		8		9			
Hawaii	9,000					1			
Idaho	8,000	1		3	1	2			
Illinois	127,000	4	1	5	4	15	3		
Indiana	57,000	4			6	6			
Iowa	36,000	8				9			
Kansas	27,000	2	1	1		7			
Kentucky	34,000	1	3	2		6			
Lousiana	47,000					13			
Maine	13,000	2		1		3			
Maryland	47,000	3		4	1	3			1
Massachusetts	69,000	7	2	12	2	9			
Michigan	100,000	6	1	7	2	9	1		
Minnesota	49,000	2	1	4	6	10			
Mississippi	26,000		1	1		5			

TABLE 5.6. *Linkage facilities and programs by State relative to instructional staff in elementary and secondary education: selected years*—Continued

State	Staff	GIC	SIC	TC	SSC	EL	EC	RL	RDC
Missouri	50,000		1	2	1	11		2	
Montana	9,000	1				2			
Nebraska	19,000	3	2	2		8			
Nevada	6,000	1		2		2			
New Hampshire	10,000		1	3		1			
New Jersey	90,000	2	1	3	4	11	1		
New Mexico	13,000		2	3	1	5	1		
New York	208,000	15	3	19	14	31	1		1
North Carolina	51,000	3	2	4		14			1
North Dakota	8,000	3		6	1	1			
Ohio	115,000	9		11	3	22	1		1
Oklahoma	28,000		1	1	1	8			
Oregon	23,000	3	1	4	1	5	1	1	1
Pennsylvania	128,000	8	3	7	4	28		1	1
Rhode Island	11,000	1		1		3			
South Carolina	29,000		1			6			
South Dakota	9,000	1		5		4			
Tennessee	38,000	1	3	1	1	13			
Texas	133,000	11	2	21	1	18		1	1
Utah	12,000	3	3	3		3			
Vermont	7,000			5		1			
Virginia	53,000	5			1	6	2		
Washington	35,000		1	4	1	8			
West Virginia	18,000	3	1	9		3		1	
Wisconsin	56,000	3	2	6	1	12			1
Wyoming	5,000		1		1	1			

KEY TO ABBREVIATIONS

Staff – Instructional staff in elementary and secondary education, 1972. NCES, *Digest of Educational Statistics: 1973 Edition* (Washington: Government Printing Office, 1974).

GIC – General educational information centers. J. Wanger, *Directory of Educational Information Resources* (New York: CCM Information Corp., 1971).

SIC – Special educational information centers (chiefly on vocational education and education of the handicapped). Wanger; *Directory of Educational Information Resources.*

TC – Teacher centers. Syracuse University Teacher Center Project.

SSC – School study councils. National School Development Council.

EL – Education libraries of teacher-training institutions. *College Blue Book, 1969-1970* (New York: CCM Information Corp., 1969).

EC – ERIC clearinghouses. NIE.

RL – Regional laboratories. NIE.

RDC – Research and development centers, educational policy research centers, both NIE.

CHAPTER 6
UTILIZATION OF EDUCATION R&D PRODUCTS AND INFORMATION

A. BACKGROUND FACTORS

Education R&D does not have an impact on practices in education that is comparable with, for example, the impact of biomedical research on health care. The lesser impact of R&D in education has been attributed to the poor quality of R&D products that provide a basis for educational improvement, poor linkage between R&D personnel and educators, and lack of innovation in some school systems. To the extent that they are valid, all three attributions suggest future R&D priorities. Fortunately, some R&D products have proved to be effective, attractive, and affordable. Linkage in some States and local areas is excellent. Some school systems have given R&D products a fair chance to prove their value.

Even good R&D products do not sell themselves to schools, nor are they educational panaceas. None is even a "broad-spectrum treatment" for educational ills. Researchers, developers, and educators have generally abandoned the analogy with biomedical R&D. A good education R&D product may provide benefits to many students but some students can thrive on less and others will need still more.

This chapter reviews two kinds of utilization programs: (1) those undertaken by school systems to analyze existing practices and determine areas of needed innovation, and (2) those undertaken, usually by developers, on behalf of specific R&D products.

B. UTILIZATION RELATED TO GENERAL CLASSES OF INNOVATION

There can be a confusion of terms around the concept of utilization. A school system can improve its practices without external R&D support, just as it can adopt products of external R&D without substantively improving its practices. It is sometimes observed that a school system adopts an R&D product in name only; utilization does not always follow adoption. In this decade, John Goodlad and his associates observed:

> . . . some of the highly recommended and publicized innovations of the past decade or so were dimly conceived and, at best, partially implemented in the schools. . . . (Teachers and principals) claimed individualization of instruction, use of a wide range of instructional materials, a sense of purpose, group process, and inductive or discovery methods when our records showed little or no evidence of them.[1]

Richard Carlson presented examples of adoption of R&D products without improvement in education practices in the 1960's. In the case of programed instruction, Carlson found:

> In a dramatic way, programed instruction forces a school to stand face to face with the fact that students learn at widely varying rates. It is true that some of the most shop-worn cliches, such as 'we teach children, not subjects' and 'start the learning experience where the child is' reflect a concern for individual differences and suggest that educators are most anxious to tailor learning needs and speeds to individuals. However, when faced with programed instruction which permits students to work at their own rates, the hollowness of the

1. John I. Goodlad et al., *Behind the Classroom Door* (Worthington, Ohio: C.A. Jones, 1974).

cliches was exposed... solutions were developed to 'take care of' students who either finished too early or did not finish (and) to keep students working at similar rates.[2]

Although such misapplication of new practices draws justifiable criticism, attention should also be given to the thousands of examples of new practices, some developed in R&D settings and others in school settings, that school systems adopt judiciously and use properly. Millions of students have been exposed to new curriculums in such areas as reading, mathematics, social studies, science, and career education by teachers who have received inservice training and have become proficient in the new approaches. Thousands of classrooms and school libraries have installed "self-learning centers" where students can choose their own audiovisual materials and work at their own pace.

Some school systems have formed consortiums, often using a university as a coordinator and resource center, to examine existing practices and determine areas of needed innovation. A detailed description of the operation of one consortium is presented in the report of experiences from 1967 to 1971 in the "Kettering-Colgate Project." Sponsored by the Charles F. Kettering Foundation, the project involved the resources of Colgate University and 26 schools in central New York State.[3] In the course of the project, 31 innovations were introduced into various schools, observed by staff of other schools, evaluated, modified, and, in particular schools, either continued or discontinued. The innovations ranged from Harvard's Project Physics to Uses of the Computer in Classroom Testing and Multi-Media for Creative Communication.

Phi Delta Kappa conducted a survey in 1965 of diverse innovations in 323 school districts. The number of schools reporting each type of innovation is shown in Table 6.1. The schools' descriptions of innovations imply local development of some, "importation" of others. There is little consistency in the description of innovations, suggesting that schools adapt and even rename innovations in the process of using them.

In 1969, Gideonse sought to identify the innovations that had greatest impact in the schools during the 1960's and earlier periods. His list included language laboratories, team teaching, nongrading, programed instruction, and the mathematics and science curriculums developed by NSF commissions.

Data on innovation in the schools as of 1971 are provided by Ronald and Mary Havelock in a

2. Richard O. Carlson, *The Adoption of Educational Innovations* (Eugene: University of Oregon, Center for the Advanced Study of Educational Administration, 1965), p. 76.

3. George E. Schlesser et al., *A Study of Innovation and Change in Education: The Regional University-Schools Research and Development Program* (Hamilton, N.Y.: Colgate University, Office of Educational Research, 1971).

TABLE 6.1. *Types of innovations in selected U.S. school districts: 1957-64*

ADMINISTRATION AND SUPERVISION: Democracy in administration (11), Evaluation of teachers (4), Inservice training (55), Organization of staff (4), Public relations (19), School board (6).

ELEMENTARY EDUCATION: Academically talented students (6), Arithmetic (5), Departmentalization (4), Foreign language (15), Grouping of students (12), Libraries (8), Non-English speaking students (7), Nongraded primary plans (16), Physical education (9), Reading (19), Reporting student progress (4), Science (13), Social studies (5), Technology in teaching (4), Working with parents (11).

SECONDARY EDUCATION: Academically handicapped students (4), Academically talented students (6), American heritage (6), English (20), Grouping of students (9), Guidance (12), History (4), Mathematics (9), Organizational plans (8), Reading (24), Scheduling (4), Science (22), Vocational training (10).

SPECIAL ADAPTATIONS, ALL LEVELS: Academically talented and exceptional students (19), American heritage (6), Curriculum materials (4), English (5), Guidance (5), Libraries (4), Mathematics (4), Physical education (6), Reading (9), Science (7), Technology in teaching (11), Working with parents (10).

NOTE.–Parenthetical figures indicate the number of different innovations reported in this category in a survey of 323 school districts. Altogether, 628 innovations were categorized.

Source: B.J. Fallon, ed., *Educational Innovation in the United States* (Bloomington, Ind.: Phi Delta Kappa, 1966).

1973 report.[4] Table 6.2 shows the relationship between district size and the number of innovations reported by each of 353 school districts. Although the number of reported innovations increases with district size, the per-student rate of innovation decreases from more than one innovation per 100 students in the smallest districts to less than one innovation per 5,000 students in the largest districts. There is a limit, of course, to the number of innovations that any organization, however large, can absorb. The Havelock data do not indicate whether an individual student in a large district was exposed to more or fewer innovations than an individual student in a small district.

Table 6.3 shows the distinction that school districts in the Havelock survey made between innovations that were widely implemented and those that were most significant. Administrative innovations of various kinds were the most widely implemented, but innovations concerned with individualized instruction and team teaching were deemed most significant by school districts responding to the survey.

In addition to administrative and curricular innovations, the Havelock survey investigated "technical and social support" innovations. As detailed in Table 6.4, these innovations are intended to help teachers of all subjects. They are tools for teaching and learning, and several are based on recent technological developments.

TABLE 6.2. *Estimated mean frequency of selected innovations in a sample of 353 U.S. school districts, by size of enrollment: 1971*

Size of enrollment	Estimated mean frequency
Under 300 students	5.7
300-2,499	7.7
2,500-4,999	8.5
5,000-9,999	9.5
10,000-24,999	11.1
25,000-79,999	12.8
80,000 and over	13.2

Source: R. Havelock and M. Havelock, *Educational Innovation in the United States* (Ann Arbor: University of Michigan, Center for Research on the Utilization of Scientific Knowledge, 1973).

In Urban Secondary Schools

Nelson and Sieber[5] have used the Havighurst et al.[6] data on big city schools to explore the effects

4. Ronald Havelock and Mary Havelock, *Educational Innovation in the United States* (Ann Arbor: University of Michigan, Center for Research on the Utilization of Scientific Knowledge, 1973).

5. Margaret Nelson and Sam D. Sieber, *Innovations in Urban Secondary Schools* (New York: Columbia University, Bureau of Applied Social Research, 1975).

6. Robert Havighurst, Frank Smith, and D. Wilder, "A Profile of the Large-City High School," *The Bulletin of the National Association of Secondary School Principals* (Reston, Va., January 1971), pp. 3-94.

TABLE 6.3. *Percentage of administrative and curricular innovations considered "most significant" by surveyed U.S. school districts: 1971*

Type of innovation	Percentage of "most significant" innovations*	Percentage of total sample**	"Most significant" as percentage of total sample
Individualized instruction and team teaching	29	16	20
Administrative innovations (includes R&D, budget, school-community relations, staffing and staff training)	21	28	8
Programmatic approaches to instruction (includes special programs for special groups, tutoring, disadvantaged, aides, paraprofessionals)	19	12	17
Curriculum change	16	21	8
Organizational innovations (includes grade levels, scheduling, attendance units, alternative schools)	12	8	16
Instructional technology and facilities	5	15	4

*Percentage based on 346 innovations deemed "most significant" in 1970-71 by 353 school districts in a national sample.

**Based on a total of 3,185 innovations reported.

Source: R. Havelock and M. Havelock, *Educational Innovation in the United States* (Ann Arbor: University of Michigan, Center for Research on the Utilization of Scientific Knowledge, 1973).

TABLE 6.4. *Percentage of technical and social support innovations in surveyed U.S. school districts:* 1971*

Area of innovation	Percentage of districts reporting each innovation
Human relations programs	43
Inservice training	41
Planning, research, and evaluation	40
Media centers	32
Aides and paraprofessionals	32
Videotape and television	29
Computer and data processing	22
Audiotape and tape recorders	8
Teaching machines	6

NOTE.–National survey sample of 353 school districts.

Source: R. Havelock and M. Havelock, *Educational Innovation in the United States* (Ann Arbor: University of Michigan, Center for Research on the Utilization of Scientific Knowledge, 1973).

of quality, difficulty of implementation, durability (probability that an innovation will retain its form), and cost upon adoption and use of new products. Table 6.5 lists the 17 innovations studied, with the percentages of schools in which they appeared.

Although quality and cost are not correlated, a positive correlation was found between quality and frequency of adoption/use. Eliminating one innovation, telephone amplification, "on the grounds that it is so rarely adopted as to suggest widespread ignorance of its availability," Nelson and Sieber found a positive correlation between cost and frequency of adoption/use. Since adoption/use declined slightly with increasing difficulty of implementation, the authors view the correlation between cost and frequency of adoption/use as a function of the transportability and easy implementation of high-cost innovations.

Nelson and Sieber suggest that the adoption and use of high-cost innovations of doubtful quality cannot be explained entirely by their greater ease of implementation or by the necessity of persevering in a high-cost decision once made. They argue that high-cost innovations are highly visible and may be used to mobilize support for the schools while deflecting criticism from activist groups.

C. UTILIZATION RELATED TO SPECIFIC R&D PRODUCTS

It has become clear since the late 1960's that R&D products do not sell themselves to schools.

TABLE 6.5. *Selected innovations in urban secondary schools: 1969*

Innovation	Percentage of schools reporting each innovation*
Language laboratory (device used to present recorded voices as part of the audiolingual approach to learning language)	67
Instructional materials center (extensive library collection complemented by a wide variety of audiovisual materials for direct student use, not limited to one or a few substantive areas)	47
Teaching teams (course under the direction of two or more teachers, all of whom participate in planning and meeting the class sessions)	41
Resource center (specialized center with learning materials specifically selected in terms of relevance to one or more substantive areas, usually with adult staff who provide assistance)	39
Television instruction (students view open or closed circuit TV regularly as basic instructional process for completing a course for credit)	36
Independent study (student initiates work on a topic of interest and uses available resources, but consults with teachers only when needed)	29
Back-to-back scheduling (students in two different subjects scheduled in sequential periods to foster cooperative teaching among teachers of different subjects)	29
Directed study (students complete work for credit independent of group task but under supervision of a specific teacher with whom student meets at least once a week)	28
Nongraded program (series of courses open to all students with interest and potential for success without regard to grade level of student and/or sequence of courses)	25
Simulation or gaming (device used to create a problematical situation, whether realistic or logical, involving students in strategy and decision-making)	25
Programed instruction (students, independently or in groups, use programed texts without machines for completing course for credit)	21
Continuous progress (students within course work at own pace with long-term completion date through	

TABLE 6.5. *Selected innovations in urban secondary schools: 1969*—Continued

Innovation	Percentage of school reporting each innovation*
predesigned units of study including various materials; course may or may not have prescribed final completion date)	19
Teaching machines (mechanical device involving programed material arranged in minute steps with immediate feedback as to correctness of response)	16
Flexible scheduling (scheduled courses meet for various periods of time during different segments of the day)	15
School-within-school (for administrative, guidance, and/or instructional purposes, students and faculty are organized into smaller than total school units)	13
Telephone amplification ("discussions held by students with persons away from school via telephone with supplementary amplification")	7
Optional attendance (selected students are permitted to decide if they will attend a given session of a particular scheduled class)	2

*Number of schools reporting on each innovation varies from 635 to 653.

Source: M. Nelson and S. Sieber, *Innovations in Urban Secondary Schools* (New York: Columbia University, Bureau of Applied Social Research, 1975).

Accordingly, researchers and developers have initiated various arrangements for utilization. At a minimum, such arrangements provide for local demonstration of products, workshops to begin inservice training of local personnel, and many printed materials about the attributes of products.

Some researchers and developers establish long-term relationships with school systems. In such relationships, the R&D staff provides continuing technical assistance in implementing a product, while schools provide data on product performance and problems of implementation. An example of such an arrangements is the consortium involving Pittsburgh's Learning R&D Center, Philadelphia's Research for Better Schools, and school districts located chiefly in Pennsylvania but in other States as well. This consortium is concerned with implementation of Individually Prescribed Instruction, originally developed in Pittsburgh and extended in Philadelphia.

The development and utilization histories of 30 "exemplary" products of education R&D have been described in two compendiums.[7] Table 4.13 in Chapter 4 lists the product, developer, and the extent to which these new practices and arrangements were being used in the schools as of 1971-73.

NIE-Sponsored Products

The NIE-sponsored products described in section 4.D. have been used in all 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands. Table 6.6 shows the number of NIE-sponsored products used in each State and territory. Products used in one district only are excluded; a considerable number of products being tested in single districts thus do not inflate totals reported in the table.

Certain States, such as Missouri and Oregon, account for more utilization of NIE-sponsored products than would be predicted from their school-age populations. Relationships established between school districts and regional laboratories in those states are probable reasons for higher utilization, although data gathered in the NIE survey have yet to be analyzed in such detail.

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7. D.W. Kratochvil et al., *Product Development Reports* (Palo Alto, Calif.: American Institute for Research, 1971-72); B.J. Turnbull et al., *Promoting Change in Schools: A Diffusion Casebook* (San Francisco: Far West Laboratory for Educational Research and Development, 1974).

TABLE 6.6. *Number of NIE-sponsored products used or tested in multiple school districts in each State and territory: 1975*

Location	No. of products*	Location	No. of products*	Location	No. of products*
Alabama	64	Maine	59	Oregon	127
Alaska	63	Maryland	74	Pennsylvania	181
Arizona	100	Massachusetts	76	Rhode Island	30
Arkansas	35	Michigan	124	South Carolina	49
California	239	Minnesota	117	South Dakota	37
Colorado	171	Mississippi	48	Tennessee	90
Connecticut	64	Missouri	141	Texas	150
Delaware	45	Montana	57	Utah	60
Florida	89	Nebraska	49	Vermont	40
Georgia	103	Nevada	52	Virginia	82
Hawaii	41	New Hampshire	48	Washington	97
Idaho	69	New Jersey	109	West Virginia	56
Illinois	136	New Mexico	56	Wisconsin	85
Indiana	97	New York	129	Wyoming	20
Iowa	56	North Carolina	54	District of Columbia	51
Kansas	57	North Dakota	31	Puerto Rico	15
Kentucky	99	Ohio	103	Virgin Islands	11
Louisiana	83	Oklahoma	65		

*A total of 382 products were reported on.

Source: NIE, *Catalog of NIE Education Products* (Washington: NIE, 1976).

CHAPTER 7
EMERGING FACTORS

Large-scale, systematic efforts to improve education through the R&D cycle of research, development, dissemination, and utilization have a brief history. From the successes and failures of two decades of education R&D, several effective models have been proposed. Some have been tested to a limited extent; others are still "on the drawing board." Like other social processes in which the United States calls upon itself to improve performance and equity, education is extraordinarily complex. As problems of education are better understood—in particular, as an appropriate role for R&D is recognized in relation to each problem—it is likely that better R&D models will also evolve.

The *Databook* cannot definitively answer the question, "What are the factors that will create new roles and requirements for education R&D in 1985?" At most, it can be said that the following factors are among those that will affect the future of education R&D:

Technological discontinuities. With the rise of each new technology, there is need for R&D to explore the potential of the technology and sort out its applications in education. For example, the technology of audiovisual media has been a driving force in education R&D since World War II. Computer technology has only begun to be incorporated into instructional and administrative systems for the schools.

Social problems. The potential of education to solve or ameliorate social problems is a deeply held value in our society. As education is called upon to solve or ameliorate future social problems, R&D will be required.

The unanswered questions of educational process. A progressing field of R&D raises new questions as quickly as old ones are answered. The cumulative character of science builds upon better questions as much as, or more than, on better answers. For example, the present legacy of 19th-century physics is not the answers it provided, many of which are now obsolete, but the questions it raised to direct 20th-century physics. Similarly, the answers provided by the first decades of education R&D are not as important as unanswered questions that shape the future agenda of education R&D.

New Research Paradigms. The dominant paradigms of education R&D in the 20th century have been remarkably diverse: logical positivist, Freudian, behaviorist, phenomenologist, Piagetan, systems analytic, cybernetic, and so on. New paradigms arise constantly; most stimulate a certain amount of R&D. The useful paradigms persist; the others become footnotes in the literature.

New research methods. Social scientists are often derided for their concern with methodology; however, every field of empirical science passes through a phase that appears to have excessive concern for methodology. Physics and chemistry passed through their methodological phases centuries before those phases became preoccupations of psychology and sociology. Historians of science report that the method-building phase of every field of empirical science is awkward and untidy.

New research methods in the social sciences are about equally divided between data gathering and data analysis. Methods of collecting perceptual, cognitive, attitudinal, and behavioral data from the individual, as well as methods of observation of group process, have stimulated much education R&D for purposes of data-gathering improvement. Discriminant analysis, multiple regression, factor and cluster analysis are among techniques that have also stimulated education R&D for purposes of data-analysis improvement.

Like new theoretical paradigms, new research methods constantly arise. The narrow or broad range in which each can be used is discovered in R&D applications over time.

The spontaneous curiosity of researchers and developers. The importance of spontaneous curiosity, in terms of results of both basic and applied research, is acknowledged in some sponsored R&D programs, for example, in NIE's Field Initiated Studies. As in the past, at least some educational R&D will be undertaken to satisfy the curiosity of researchers and developers.

Appendix 1
GROUPS AND DIVISIONS OF NIE

DISSEMINATION AND RESOURCES GROUP

Responsible for improving dissemination and utilization of knowledge for solving educational problems, the activities of this Group include the study, evaluation, and improvement of the capabilities of institutions and individuals to produce and use knowledge in improving education. This Group has the following three Divisions:

Information and Communications Systems Division

Carries out programs to provide access to documents and data about education to researchers, teachers, administrators, and others concerned with educational improvement, and builds capacity for the dissemination and utilization of educational knowledge. The Division operates the Educational Resources Information Center (ERIC); supports research and development activities intended to improve educational information systems; stimulates the linkage between local educators and national information sources; and generates the development of information products which can be used to make and implement educational decisions.

School Practice and Service Division

Carries out programs to insure the use of the results of R&D and methods to improve educational practice. The Division provides implementation support to educators adopting or adapting verified products and practices; synthesizes, analyzes, transforms, and communicates consumer-oriented information on educational research and products; monitors products and verifies information on them; reports on effective programs; supports exchange mechanisms among the R&D resource base, State educational service agencies, and local schools and school districts to insure effective use of R&D results. It also helps other NIE organizations design and implement strategies for disseminating and diffusing the results of NIE development, including the management of the NIE copyright program.

Research and Development System Support Division

Carries out programs to help strengthen the education R&D system. The Division conducts a range of surveys, analyses, and policy studies concerned with the status and requirements of education R&D with a view toward current and future Government policy with regard to the system. It intervenes to improve the R&D system, with particular attention to national R&D capacity, the availability of an adequate pool of trained personnel for education R&D, and the improvement of technology for education R&D.

BASIC SKILLS GROUP

This Group is responsible for carrying out research on the teaching and learning of basic subjects (primarily reading and mathematics) and on the measurement of student progress in these areas. Through the application of research findings and new developments to classroom instruction, the Basic Skills Group expects to provide a sound basis for the improvement of education and for equal educational opportunity. This Group has the following three Divisions:

Learning Division

Supports research on how children learn, with an initial focus on reading comprehension and individualized learning.

Teaching Division

Supports research on improving the teaching of reading and mathematics focusing on definition and measurement of teacher competencies as related to student performance. It explores the impact of mission-oriented or highly structured teaching on children.

Measurement Division

Supports research to improve the measurement of reading and mathematics learning and teacher performance in basic skills instruction, focusing on the development of ways to overcome test bias in measuring minority student performance and on the improvement of methodology available to measure educational practice.

FINANCE AND PRODUCTIVITY GROUP

This Group is responsible for carrying out a program to improve the effectiveness and efficiency of our educational institutions through a program of policy studies; R&D in areas of finance, management organization, and alternative delivery systems; and the application of competency concepts. The Group has five Divisions and one program staff unit as follows:

School Finance and Management Division

Conducts studies and analyses of alternative financing reforms to assist State and local decision-makers in achieving a more equal standard of educational equality for all students. It develops and field tests alternative financing and management arrangements to improve institutional responsiveness.

Technological Applications Division

Develops technological applications in data management systems to improve the effectiveness and efficiency of educational institutions, and applications in instructional systems to improve access for special populations, such as the handicapped and geographically isolated, whose needs are not presently being met.

Productivity Division

Conducts policy studies, and R&D in competency concepts, the economics of education, and organizational behavior aimed at improving the efficiency of American education.

Assessment of Innovative Developments Division

Conducts R&D, and application of new assessment methodologies to improve our understanding of the effectiveness of educational practices with an emphasis on increased productivity.

Experimental Schools Divisions

Plans, organizes, administers, and evaluates multiyear projects that test the effects of changes in schools and school systems involving a wide spectrum of components including but not limited to curriculum, administration, instruction, and governance.

Post-Secondary Finance and Organization Staff

Studies and analyzes the effect of alternative forms of public support on institutional viability and equality of educational opportunity. Conducts policy studies on the impact of developing competency concepts on governance, organization, institutional responsiveness, and equality of educational opportunity.

SCHOOL CAPACITY FOR PROBLEM-SOLVING GROUP

This Group is responsible for identifying and understanding how school systems develop the capacity for problem-solving and for finding ways of helping other schools to do so. The Group will study the workings and assess the effectiveness of selected organizational strategies in initiating and sustaining school improvements; identify and study policy and basic research issues involved in the development and implementation of such strategies; and develop ways of utilizing the knowledge generated by the study of policy and basic research issues to help schools and school systems to employ various strategies.

EDUCATION AND WORK GROUP

Responsible for carrying out a program to improve the preparation of youth and adults for entering and progressing in careers, this Group will develop and test projects that increase understanding of the issues and problems associated with education and work; support programs that will develop the skills and abilities necessary for successful entry and progress in careers; and conduct policy studies to determine how to insure effective dissemination and implementation of the results of Education and Work programs and projects, and to determine directions for new activities. This Group has the following four Divisions:

Career Awareness Division

Carries out a program concerned with how children's early attitudes and aspirations about the world of work are formed; how these attitudes and aspirations affect later education and occupational decisions; and how educational programs can most effectively intervene in this process. This Division supports research on socialization and decision-making processes as they affect career development, and supports the development, evaluation, and dissemination of products and programs which enhance individual career awareness.

Career Exploration Division

Carries out a program concerned with how youth can learn to explore careers more effectively; how to improve the transition from school to work; and how in-school work experiences can become more effectively integrated into the secondary school curriculum. The Division supports research to improve the understanding of career development; evaluates ongoing career exploration programs; conducts policy studies to determine how effective career exploriation programs can be stimulated for diverse segments of society; and supports the development and dissemination of programs, materials, and products which help schools and other educational institutions offer exploratory career experience to students and young adults.

Career Preparation Division

Carries out a program concerned with determining what abilities and skills youth and adults need to prepare for work and their chosen future careers, and how these abilities and skills can best be learned and/or provided for. The Division supports the development and testing of various projects directed toward enhancing skills of adults and youth; designs and executes policy studies aimed at determining the role the Federal Government should play in fostering such skill acquisition; and conducts research on the character and manner of skill acquisition and credentials necessary for career entry and progression.

Career Access Division

Carries out a program concerned with increasing an individual's lifelong access to school and work; determining what structural and systematic barriers impede that access; and determining what education can do to remove such barriers. The Division supports the development and testing of various projects to increase knowledge of the barriers faced by different target populations in receiving education; determines through program development the most effective ways of delivering these services to target populations; and determines through policy analysis the most appropriate role for Federal, State, and local interventions in the provision of these services.

EDUCATIONAL EQUITY GROUP

This Group is responsible for carrying out programs to investigate and develop ways to help educators meet their responsibilities of providing a high-quality education for students whose opportunities have been limited because of their home language, culture, race, ethnicity, sex, socioeconomic background or student conduct problems, or because the are not profiting from a typical school environment. The Group will also conduct R&D into new areas of special concern associated with educational equity as they are identified. This Group has the following two Divisions and three program staff units:

Compensatory Education Division

Carries out comprehensive studies and evaluations of compensatory education programs such as title I of the ESEA and programs States are carrying out to deal with the disadvantages of students with low socioeconomic backgrounds.

Multicultural/Bilingual Division

Carries out a program to address the problems of students whose native language is not English, who speak a nonstandard dialect of English, or whose culture differs significantly from that of the majority of American students. The Division administers a program of R&D in instructional processes such as curriculum, teaching and social assessment, as well as in social/cultural processes which influence education for multicultural/bilingual students.

Women's Research Staff

Carries out a program which addresses the problems faced by women in obtaining equal educational opportunities by investigating the processes by which inequalities occur and seeking solutions for the elimination of such inequalities.

Desegregation Studies Staff

Carries out a program to investigate problems associated with school desegregation and to seek solutions to help educators determine the best ways to educate students in desegregated settings.

School Discipline Studies Staff

Carries out a program to investigate and seek solutions to problems associated with disruption, crime, and student conduct problems in schools.

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Appendix 2
INTERAGENCY PANELS IN EDUCATION R&D

MEMBER AGENCIES OF THE INTERAGENCY PANELS FOR RESEARCH AND DEVELOPMENT ON EARLY CHILDHOOD AND ADOLESCENCE

Department of Agriculture (USDA)
Department of Health, Education, and Welfare (DHEW)
- Bureau of Community Health Services (BCHS)
- National Institute of Alcohol Abuse and Alcoholism (NIAAA)
- National Institute of Child Health and Human Development (NICHD)
- National Institute of Drug Abuse (NIDA)
- National Institute of Education (NIE)
- National Institute of Mental Health (NIMH)
- National Institute of Neurological and Communicative Disorders and Stroke (NINCDS)
- Office of the Assistant Secretary for Planning and Evaluation (ASPE)
- Office of Child Development (OCD)
- Office of Education (OE)
- Office of Human Development (OHD)
- Office of Youth Development (OYD)
- Rehabilitation Services Administration (RSA)
- Social and Rehabilitation Service (SRS)

Department of Housing and Urban Development (HUD)
Department of Justice
- Law Enforcement Assistance Administration (LEAA)

Department of Labor (DOL)
Office of Management and Budget (OMB)
- ACTION
- Bureau of the Census

MEMBER AGENCIES OF THE FICE SUBCOMMITTEE ON RESEARCH, DEVELOPMENT, DISSEMINATION AND EVALUATION

ACTION
Department of Agriculture
Department of Commerce
Department of Defense
Department of Health, Education, and Welfare
- Administration on Aging
- Alcohol, Drug Abuse, and Mental Health Administration
- National Institute of Education
- National Institutes of Health
- Office of the Assistant Secretary for Education
- Office of the Assistant Secretary for Planning and Evaluation
- Office of Child Development
- Office of Consumer Affairs
- Office of Education
- Office of the Secretary

Department of Labor
Department of State
Federal Communications Commission
General Accounting Office
National Endowment for the Arts
National Endowment for the Humanities
National Science Foundation
Office of Management and Budget (Observer)

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