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ABSTRACT

Federally funded educational knowledge production is a recent phenomenon, having expanded exponentially during the 1960's and 1970's. Accordingly, in response to current public scrutiny of the use of federal funds and of education itself, a historical review and assessment of the role of the federal government in relation to educational knowledge producing organizations is presented. After an overview of the immediate origins of the present proliferation of federally funded agencies in the 1960's and the assumptions behind that expansion, a historical background is provided, tracing earlier initiatives and the federal government's past connections to education. Topics include the original Bureau of Education (est. 1867); the intellectual origins of educational knowledge production (1900-1945); the Eight Year Study, a pioneer government-sponsored research and followup study of curriculum reform (1932-40); the evolution of the Bureau, Office, and finally the Department of Education; the emphasis on science in the 1950's; the "bureaucratic-professional complex"; an overview of the rapid proliferation of federally sponsored educational research and development from 1964-79; and the formation and purpose of the National Institute of Education. The review concludes with recommendations for clearer understanding and greater coordination of educational knowledge production. (TE)

LEARNING RESEARCH AND DEVELOPMENT CENTER

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Chapter 6

Institutionalized Knowledge Production for Education

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Current knowledge production for education is largely carried out in organizations that did not exist twenty years ago. Given the history of local and state jurisdiction over education in America and because of the ambiguity of the federal role in relation to education, federally funded educational knowledge production is a recent phenomenon. It is federal funding which has made possible educational knowledge production as it now exists. At the present time there are a number and variety of organizations whose sole purpose is in one way or another to enhance the knowledge base upon which decisions affecting matters educational can be made. The recent and rapid development of these organizations suggests that the time is appropriate to reflect upon the current configuration of educational knowledge producing organizations. And, within that reflection, to consider the role of the federal government in relation to these organizations.

It is difficult if not impossible to estimate the total amount of money being spent on knowledge production in education; it appears impossible even to ascertain accurately the amount of money the federal government is expending. Various agencies looking into this question have variously reported federal expenditures depending upon their definition of "knowledge production" and their definition of "educa-

tionally related work." For the m[illegible] ps the best estimate of federal involvement in educational [illegible] roduction, in financial terms, is that projected by the Nat[illegible]itute of Education (Paisley, Paisley and Shapiro 1976, pp. 15 [illegible]e Institute's figures indicate a federal expenditure between $430 [illegible]n and $520 million, with $470 million the most likely estimated number. Those figures are for federal expenditures alone and do not include monies expended by the states or by private foundations. A study conducted by the National Science Foundation estimated an expenditure of approximately $40 million in state funds for knowledge production in the mid-70's and an expenditure of approximately $[illegible] million in foundation funds for the same function. There are no estimates available for other sources of funding such as educationally related R&D conducted in the private sector. In any case, when these numbers are compared to federal expenditures for educational knowledge production in the late 50's, or any period prior to that, what is clear is that a tremendous expansion of effort and expenditure has occurred. (Gideonse shows an increase in the Office of Education's appropriations for "Research and Training" from $1,000,000 in 1957 to $102,452,000 in 1969 [Bureau of Research, Office of Education 1969, p. 158]).

This expansion began in the 1960's though its roots are in legislation passed by Congress in the 1950's. Numbers of organizations and people engaged in knowledge production for education grew rapidly throughout the 60's. In the early 1970's, expansion of effort continued in some areas and retrenchment began in others. At the present time, questions of the uses to which federal funds are being put are highly salient in the public mind. In addition we are, again, in a period of questioning appropriate forms and formats for education. Organizations for knowledge production in education are caught up in these two sets of questions and their budgets, as well as their missions and priorities, are under close scrutiny.

KNOWLEDGE PRODUCTION FUNCTIONS FOR EDUCATION

A listing of the functions which must be fulfilled for knowledge production in education reveals the following needs: knowing what questions are salient; finding methods to answer those questions; finding

reliable and valid answers; ascertaining that these answers are also feasible; helping others to put the answers to use; verifying that the answers, in use, make a positive difference in the educational process.

There are more technical terms for the activities associated with fulfilling these functions. Each of these activities tends to be associated with fulfilling one function more than others; yet, they can be associated with several. (That is, for example, research can be conducted on the efficacy of any one of the steps in the knowledge production process.)

Six major categories of activity suggest themselves as essential. The first of these is *needs assessment*, i.e., an estimation of what it is that knowledge producers should be oriented to, what immediate and long-range problems will be facing educational practitioners, planners, or policy-makers for which a knowledge-base must be developed. The second major activity is *research*. Educational research spans a wide domain of activity and includes within itself a wide variety of disciplinary orientations. Educational research is the work done by psychologists on learning and instruction. It is the work done by sociologists and social psychologists on environments and organizations for education. It is the work done by economists on appropriate fiscal support for education. It is, in addition, the work done by professional educators, in any one of these areas or others. The third, *development* activity, involves development of materials, practices, or policies. Development extends research and links it to the world of the practitioner. Development itself is an activity comprising several forms, from small-scale, experimental materials development to large-scale, programmatic multi-level development. The fourth is *dissemination*. Once research and development have been conducted there is the need to disseminate widely the findings and materials. *Utilization* activity, the fifth, is support for the practitioner in his or her efforts to implement, adapt, and utilize the knowledge that has been produced. This area, having been little scrutinized in the past, is now itself the object of study and research. The sixth activity, *evaluation/assessment*, focuses on the value or quality of the knowledge that has been produced.

ORGANIZATIONAL FORMS

In thinking about the organizational forms appropriate to fulfilling these functions and carrying out these activities there are a number

of possibilities. One might decide to construct a different organization for each function and accompanying activity. Examples of this in education exist. That is, there are organizations whose sole commitment is to the design and conduct of evaluation studies. Or, one might design multi-faceted organizations whose activities span several of these functions and there are examples of this as well.

Concentrating not on functions fulfilled but on personnel engaged reveals at least four possibilities. Each of these organizational possibilities has existed at some point in the history of knowledge production for education and all can be found as part of the current configuration. First, there is the individual scholar, with or without supporting student help, who is engaged in knowledge production, most frequently within a university. This form was the most prevalent until most recent times. The second form is a university-based organization. Here there are distinctions available between those organizations which are university based, but free-standing within a university structure, and those organizations which exist within the structure of schools or departments. The third kind of organizational form available are the non-university-based, non-profit organizations, typically funded by the federal government. And the last form are the non-university-based "for-profit" organizations. This set of categories — of existing forms, actually — is distinct from and does not map onto the set of functions enumerated above. In some of these places a multitude of activities, designed to fulfill a number of functions, are being conducted. In others concentration is on one, or at the most two, kinds of activity.

In each of these four "forms" knowledge is currently being produced to effect the education of Americans, from pre-schoolers to adult learners. It is being produced by disciplinary scholars and by multidisciplinary teams. Some of the knowledge produced is for immediate use, by policymakers or practitioners. Some is designed to be of eventual use, not immediately applicable.

Educational knowledge production spans such a variety of foci that it is difficult to delimit. Across the country, in a number of places, students, teachers, learning materials and environments, the organization of classrooms, schools and districts, the fiscal realities of education — these and many other subjects as well — are the object of concentration of psychologists, sociologists, economists, psychometricians, educators, and others.

IMMEDIATE ORIGINS OF THE PRESENT: OVERVIEW

This current broad-based and large-scale approach has its origins in the mid-nineteen sixties, in Lyndon Johnson's America, when there was a set of social facts upon which consensus could be reached easily. Among these were that science, especially in its form known as "R&D," could and would solve important social problems. Second, it was agreed that if "enough" money were spent on a problem-solving effort, the problem would be solved. A third belief was that education, especially the public education of young children, was a particularly important domain for inquiry, for social action, for change.

In 1964, the educational R&D Centers Program was created by the Office of Education of the Department of Health, Education, and Welfare. The establishment of Centers was a reification of the then current, and new, thinking about how best to impact and improve American education. The idea was that institutionalizing a scientific approach to educational change would be a most effective way to proceed. The thinking of those within the Office of Education was to implement a coherent knowledge production policy which would emanate, for the first time, from the federal level. The federal government does not have any clear authority vis-à-vis public education in the various states. This approach, this attempt to establish a research and development capacity, was part of a larger movement at the time. The "new federalism" of this period involved a number of efforts, in several fields, in which the federal government strove to solve social problems in domains over which it did not have direct sovereignty.

The Centers represented research and development on a large scale, involving substantial amounts of continuous funding, organization building and the massing of critical numbers of people. All of this was a departure from previous efforts to change education. This was the first time that the federal government would be involved at a high level of support. This was the first time large numbers of R&D personnel would work together, under this federal funding, on large programs of research and development. This was the first time a conscious effort was made to institutionalize a scientific approach to educational improvement.

The attempt was based both on the perceived need for improvement

of practice and on the then paucity of the field of research related to education. It was the case that some educational research was being conducted. There were research institutes within schools of education in a number of states. Yet, the field was meager and the connections to those discipline bases which might have strengthened it were almost non-existent. Several studies were commissioned to look into the problem, one of the most widely known being that conducted by Sam Sieber and Paul Lazarsfeld (1966). Sieber and Lazarsfeld found the existing research institutes were localistic, and largely stagnant. Of this period, it was fair to say that though there were standards by which work was judged, there was not consensus. The field lacked cohesion. It had never been strongly organized or directed at all in the national sense. Though a professional organization — the American Educational Research Association — existed, it was nothing like the bustling organization it was to become. The R&D Centers Program represented the thinking of many in Washington and many across the country. Although no similar set of organizations had existed before for educational research, there was great faith and hope that these centers would be effective.

What these organizations were to effect was American educational practice. They were to do this by producing new knowledge and knowledge products and seeing to it that these were utilized in the nation's schools. The charge to these organizations was multifaceted. They were to engage in research, development, implementation, evaluation, and dissemination.

This broad and diffuse set of attributed functions reflected the sponsoring agency's broad and diffuse goals and understandings. At the time, everyone — sponsors and performers alike — wanted to make a big difference in a hurry. It did not seem unreasonable then to ask of individual organizations that they engage successfully in this wide range of activity. Further, an inherent assumption was that the scientific nature of the organizations (and by scientific it was meant initially simply that scientists were engaged) would result in sound and valid knowledge products. Implicit in such a notion of validity is a definition that these products would be superior to those already in use and would, by this very means, find receptive audiences.

These expectations were naive, viewed in retrospect. The "mile-long building" approach to knowledge production — the assumption that a

single organization, or group of them acting singly, could house and effectively carry out the necessary multiplicity of functions — was unrealistic. What ensued then was a proliferation of organizations and differentiation and specification of the field as a whole. Before describing further the current configuration, it would be useful to trace both some earlier initiatives and the federal government's connection to education in the past. Such a tracing sheds light on both the intellectual history which the scholars in these organizations were heir to, as well as the political history which the organizations inherited.

HISTORICAL BACKGROUND

Beginnings

Space precludes a discussion of 19th century schooling and knowledge production related to it (Salmon-Cox 1978b, Ch. 3; Pratte 1973; Rippa 1971; Thayer 1969; Bailyn 1972). Suffice it to say that the history of education in this country is coterminous with the rest of its history. There have always been mechanisms, schools or otherwise, for the education of some of the citizenry. From the early 19th century on, schooling in the United States has always been a subject of discussion and controversy, and the role of governments — local, state, and federal — vis-à-vis schooling has been a shifting one.

The history of ideas and schools — ideas about children, learning, teaching — has been long but haphazard. That is, there have been many small fragmented efforts to apply knowledge, scientifically based and otherwise, to schooling practices. Almost as soon as some new disciplines emerged — e.g., sociology, psychology — the salience of education for individuals and society was recognized by being taken up as a problem for research by individual scholars. Further, the application of knowledge has always been within a political context. That is, conceptions of appropriate schooling have been part of a larger mosaic of conceptions about American society and the school has been seen, variously, as a tool for radically changing, maintaining, or modifying that society.

Even at a more specific level — e.g., what certain thinkers considered most important about children and schools — ideas have a long history. Concern with individual differences is longstanding as is concern for

providing education adaptive to individual needs. The new Centers, and their scholars, of the 1960's didn't invent these concerns, but combined them in new ways with some new strategies for changing educational practice. Perhaps most significantly, past change efforts have never been based on a programmatic large-scale scientific approach to problem-solving. This is also true of the first half of the 20th century (even as in other fields, research programs began to develop). It was this recognition that spurred the federal government attempts in the early 1960's.

The Bureau of Education

The Bureau of Education, forerunner of the United States Office of Education, was established in 1867.[1] When the Bureau was set up, its newly appointed first Commissioner of Education was Henry Barnard. Barnard, along with Horace Mann and others, was one of the educational leaders of the 19th century. He worked for reforms in Connecticut and Rhode Island, as Commissioner of Education in each of those states before becoming U. S. Commissioner. He published and edited the *American Journal of Education*, also known as Barnard's Journal (to avoid confusion with other, similarly named journals), between 1855 and 1882 producing 31 volumes (Rippa 1971). Barnard used the Journal as a vehicle for popularizing his notion that a "science of education" was needed to "transform education from a haphazard practice into an enterprise regulated by the best available thought" (Cronbach and Suppes 1969, p. 36). He viewed the Journal as a periodical "devoted exclusively to the History, Discussion and Statistics of Systems, Institutions, and Methods of Education, in different countries, with special reference to the conditions and wants of our own."

It was Barnard who argued publicly during the 1850's the need for a government office or official exclusively dedicated to the increase and diffusion of knowledge about education. There is implicit in this view the notion that simply increasing the available amount of knowledge of educational practices and of information about educational statistics would be sufficient to encourage experimentation and to induce change. This view of the potential role of knowledge is consistent with other contemporary thinking based on the belief that heightened understanding alone will lead to change and improvement.

Barnard was U.S. Commissioner for only three years. Apparently, Congress expected the new official to expend much of his time and effort setting up a system of education for the newly freed southern Blacks. When Barnard failed in this effort his office's appropriations were severely reduced year by year and he was unable to conduct even that work which he thought most important. This clash of expectations – those of Congress, for quick, massive results (but without provision of staff and adequate funding), and those of a scholar for support and funding for basic scholarship – would continue to occur and certainly foreshadows a major theme of the late 1960's vis-à-vis federally funded research and development institutes.

John Eaton, and then William T. Harris, followed Barnard in the Commissioner's office. These two carried on Barnard's work in increasing and standardizing the collection of statistics on school operations and in publishing and disseminating to state school officers pedagogical materials. This notion of improvement through enlightenment gave way, at the turn of the century, to a new wave, at least among the growing research community if not overwhelmingly within the federal bureaucracy.

Some Intellectual Origins of Educational Knowledge Production: 1900–1945

These years were marked by radical changes in the thinking about educational practice and in the actual operation of schools. The work of G. Stanley Hall, especially that of John Dewey, and of the early psychological studies of E. L. Thorndike were the immediate predecessors of the modern time.

Dewey's establishment of a laboratory school at the University of Chicago in 1896 was a major event in this period. He stated that the major goal of the school was the creation of an environment for hypothesis testing for educational practice; in addition, he hoped for the school to serve a demonstration and dissemination function as well (Bureau of Research, Office of Education 1969, p. 48). (The Chicago laboratory school led to a number of other such being set up, though by the 1940's most had lost their "internal validity" and had become simply private schools attached to universities.)

What has been called the "empiricism" of this period (Cronbach and Suppes 1969, p. 48) seems to have been of two distinctly different kinds. Yet both were rooted in the notion that the student and his performance should become the focal point of interest. During these years, school curricula were vastly revised to reflect relevant societal needs rather than classical conceptions of what constitutes an education, and the school, as an institution, increased its responsibilities for all students, adding diagnostic testing, counseling and social work expertise to its staff.

The two schools of thought referred to just above were, on the one hand, the psychological testing movement which came to pervade schools as well as other aspects of society, and on the other, the progressive education movement. Both shared similar sources. G. Stanley Hall and Edward L. Thorndike were both students of William James, author of *Principles of Psychology*.[2] James influenced his own contemporaries, and through his students, many generations more. Hall, who came to be known as the "father of the child study movement" had a direct line of influence on the progressive education movement. Thorndike and his "connectionism," his emphasis on the measurable and quantifiable, was heavily involved in the early and rapid growth of the use of mental tests.

In the 1920's and 1930's, the progressive education movement (institutionalized as the Progressive Education Association-PEA in 1919) represented a school of thought which emphasized the child and his mental, emotional and physical development as the focus of an educational program. To refer to progressive education as part of a wave of empiricism may seem peculiar. Yet, there was an emphasis in progressive schools on teaching/learning through curricula relevant to real world problems and learning experiences in which the student was an active participant and discoverer. Dewey's laboratory school work was explicitly oriented to hypothesis testing.[3] Dewey himself was leery of casting his lot entirely with the Association fearing their excesses of enthusiasm; yet his work is strongly associated with the progressive movement. It is in this sense, of hypothesis testing and of the active student-learner that progressive education is here referred to as empirical.

The testing movement also focused on the individual, by definition.

Yet, philosophically, this form of empiricism was objectionable to the progressives. Patricia Graham (1967) in her history of the Association says of the relationship between the two schools of thought:

> The standardized achievement tests, which paralleled the IQ tests in popularity, were particularly odious to the progressives, for these tests raised mastery of formal subject matter to a perilous level of importance. Testing enthusiasts played a dominant role in the scientific movement in education during the 1920's, but in the PEA statement on "scientific study" only school records of pupils' development are mentioned. Both "objective and subjective reports" of students' behavior are encouraged, but nothing is said about tests, the most common tool of "scientific study" in education (Graham 1967, p. 31).

It was under the auspices of this Association that an early, significant piece of educational knowledge production was conducted. A description of that effort will here serve as case exemplar of the argument that modern educational production has intellectual roots of some depth.

The Eight-Year Study

Of some significance, even to the present scene, was the fact that during the early decades of this century education as a field of study separated itself from the arts and sciences in higher education. Departments or divisions of educational psychology, sociology, history or philosophy sprang up, with distinct faculty. During this time, educational research became largely the province of departments of educational research within schools of education. On the one hand, this may have been perceived at the time as part of the professionalization of education (Bureau of Research, Office of Education 1969, pp. 52-53); on the other, it separated a body of thought whose focus was practice from the basic disciplines.

World War I did little to interrupt the flow of events except perhaps to heighten the prominence of mental testing (see, for example, Kamin 1974; White 1975, pp. 4-14). But the depression of the 1930's did slow

down tremendously the pace of change in education. Districts were simply unable to afford experimentation on any noticeable scale.

One widely-known piece of research that was conducted in the 1930's was the "Eight Year Study," carried out under the auspices of a commission of the Progressive Education Association. Thirty secondary schools and more than 300 colleges participated in an experiment designed to discover how an experimental group of high school graduates would compare to a control group vis-à-vis their performance in college. There were 1,475 pairs of students carefully matched on a number of variables. Students in the experimental group attended 30 high schools (public and private, representing a cross-section of American high schools) which were encouraged to make as many and varied innovations in their curricula and teaching methods as they pleased. Control group graduates had attended traditional classical high school programs. Briefly, the findings were that: "Graduates of the Thirty Schools did as well as the comparison group in every measure of scholastic competence, and in many aspects of development which are more important than marks, they did better" (Diederich 1971, p. 293).

The conduct of the study, from 1932 to 1940, had encouraged many changes in the experimental schools and engendered much enthusiasm among those involved. The study itself led to five volumes of findings entitled, "Adventure in American Education" published by Harper and Brothers in 1942. Ralph Tyler led the Committee on Evaluation and Testing and many consider that Committee's work to have led to the most important outcomes of the Eight Year Study (Graham 1967, p. 134). Another view, that of Frederick L. Redefer (for 11 years executive secretary of the Progressive Education Association), was that the most important outcome of the study (one might well label it "action-research") were the cooperative methods devised by the participating school people and researchers.

Whatever the most important outcome or outcomes, the fact was that the study was published at the height of World War II and the public was largely distracted from educational concerns. (Of the first volume of the study, 6,400 copies were sold; of the last, 1,000.) (Graham 1967, p. 133).

Following the War, spurred by the Eight Year Study as well as by advances in certain kinds of market research, local programs of school change were the common form adopted for education (Bureau of Re-

search, Office of Education 1969, p. 55). Under the leadership of visiting university professors, groups of teachers would single out inadequacies in curricula or practice and work together with the university faculty for program revision. Gideonse says of this work that some districts indeed produced thoughtful changes which they also thoughtfully evaluated. Others were less successful and, in some cases, "the entire activity was merely a method of manipulating teachers to move in certain approved directions" (Bureau of Research, Office of Education 1969, p. 55).

The Bureau of Education Becomes a Department Becomes an Office

Throughout this time of burgeoning excitement and change in conceptions of schooling, the Office of Education (so renamed in 1929 after having been a "Department" for a while) continued largely on the course set by Barnard and his followers, namely the systematic collection of statistical information. However, the form for data collection changed, becoming broader in scope and more sophisticated. The "school survey" became a major tool. Some nationwide surveys were carried out concerning the operation of "land grant colleges and universities, Negro higher education, secondary schools, teacher training institutions and school finance" (Bureau of Research, Office of Education 1969, p. 52). What distinguished these surveys from earlier ones was that they were done by groups of experts and that they conveyed an aura of scientific authority. Growing out of these efforts, many local districts, determined to continue to accrue the benefits of such science, set up research bureaus of their own.[4]

Between 1867 and 1969 there were 18 United States Commissioners of Education, and the role they filled was largely unchanged until the early 1960's when major changes were mandated by Congress. The education office was housed within the Department of the Interior until 1939 when it became part of the newly created Federal Security Agency. With the creation of the Department of Health, Education and Welfare in 1953 (Deighton 1971, pp. 545-550), the Office of Education moved there which remained its location within the government bureaucracy, until the 1979 creation of a cabinet-level Department of Education.

The systematic collection of statistical information remained the chief task of the Office of Education until the late 1950's and early 1960's. However, a few others were added earlier (Deighton 1971, p. 546). The first expansion in the office's functions occurred in 1885 when the Secretary of the Interior delegated responsibility to that office for the education of school-age children in Alaska.

In 1933, the Office of Education took over the functions of the Federal Board for Vocational Education and throughout the depression years carried out several large projects of educational assistance to the unemployed, e.g., working with those recruited for the Civilian Conservation Corps. Gradually the office took on more and more functions but it wasn't until the late fifties, with for example the passage of the National Defense Education Act of 1958, that there were any abrupt changes. This Act was based on Congressional concern for national security as that related to education and provided money for the improvement of instruction in science, mathematics and foreign languages in schools at all levels (Hazlett 1971, pp. 30-37). What ensued from the passage of that Act, and even more from the Cooperative Research Act of 1954, is the modern era.

The Fifties: The Federal Government and Science

The beginnings of the modern age of federal involvement in education can probably be traced to the 1950 enabling legislation which created the National Science Foundation. That Foundation was and continues to be charged with a number of responsibilities, among them tasks related to science education at all levels.

When it was first established, the Foundation took a survey, "an investigation of the nature and status of science education in the United States." The survey uncovered the "gross inadequacy" of the materials available. Science texts were found to be obsolete, even incorrect. From these findings came the impetus for the National Science Foundation's course content improvement of activities (Bureau of Research, Office of Education 1969, pp. 55-56).

In an excellent chapter which overviews "the federal government and social science policy in the United States," Henry Riecken (1972) recounts something of the political character of the beginnings of the

Foundation. Though the Foundation had been charged with development of an overall coordination of science policy in the country, it was viewed by pre-existing agencies as a competitor and such development was not possible (Riecken 1972, p. 177). Rather, then, the Foundation turned largely to support of basic research, albeit with some course improvement projects as noted above, and funded individual projects rather than large-scale programs of research.

In addition to questions of the form of funding the Foundation could provide, there was the question of whether or not to include social science research among its beneficiaries. Riecken notes that Congress debated this and that two strong views were expressed at the time the Foundation was established.

> One (view) was that the word "science" was to encompass simply the "hard" sciences, which have usually seemed to Americans to be more genuine than social science. . . . The other view . . . would have included the social sciences explicitly and specifically. Neither view prevailed in pure form; instead, compromise language was adopted, which permitted the Foundation to proceed at its own pace in exploring and developing programmes in social science. . . . (Congress) preserved for many years an attitude of suspicion and questioning towards projects in the social sciences and particularly towards anything that might be politically interesting or controversial (Riecken 1972, pp. 179-180).

Riecken describes two other attempts on the part of the federal government to assign "responsibility for development of science policy." The first was the 1961 establishment of the Office of Science and Technology as part of the executive branch of government. This office was itself the outgrowth of a single position, the President's Science Advisor, a role created in 1956. Throughout the sixties, the President's Science Advisor, who is also the Director of the Office of Science and Technology, was either a physical scientist or an engineer. Just as the National Science Foundation before it, the Office of Science and Technology largely either explicitly avoided matters related to the social sciences or effected them implicitly by decisions made regarding physical science projects. "Thus it is fair to say that for one reason

or another the policy of the government in the social sciences has either been undirected or has been directed by physical and biological scientists almost inadvertently" (Riecken 1972, p. 178).

Another attempt at policy coordination was the establishment of the Federal Council on Science and Technology. Riecken dismisses the work of this group, stating that its attempts were largely ineffectual.

As for education and educational research, the Cooperative Research Act signed into law in 1954 was a landmark. First appropriations under this Act were not available until Fiscal Year 1957, when Congress appropriated $1,020,190 specifically for research conducted under the auspices, but outside, of the Office of Education. Of that sum, it was mandated that $675,000 be spent on research on the education of the mentally retarded (Bureau of Research, Office of Education 1969, p. 56).

The National Defense Education Acts of 1958 provided additional money for educationally related research, especially in the areas of development and demonstration of new media for education and in the area of foreign language studies. In the early sixties, under the Cooperative Research Act, money was appropriated for curriculum improvement work in English, language arts, and social sciences; for work related to the education of handicapped young people; and for work in the area of vocational education.

In 1964, still under the auspices of the Cooperative Research Act, support was provided for the first research and development centers for education. Two R&D centers were funded in Fiscal Year 1964. One, at the University of Oregon, focused on "the organizational and administrative implications of instructional change, with particular reference to public elementary and secondary education in the United States" (Abbot 1968, pp. 25-30). The other new center, the Learning Research and Development Center at the University of Pittsburgh, had as its purpose "the scientific study of the problems of learning and instruction with particular attention to the nature of the educational and psychological environment required to maximize the potential of the individual learner" (Yeager and Glaser 1968, pp. 31-44).

Before continuing to focus more specifically on the R&D Centers Program it is important at this time to review some conceptions regarding the structure of research and research and development. In doing this, we shall move backward, to touch again on some points

already made, as well as forward to discuss some of the developments of the sixties and early seventies.

Early educational research, as conducted by Dewey, Thorndike, and others, was the pursuit of a scholar and his graduate students. Frequently, this research was similar to other such in the behavioral sciences, involving hypothesis testing and experimentation under laboratory conditions. Another aspect of this research which set it apart from psychology, for example, was the development of the laboratory school such as Dewey's at Chicago. At these schools, for some time "field" experimentation was conducted, that is, the trying out of educational hypothesis in something resembling natural settings. This kind of educational research is more similar to other profession-related research, for example, medicine as practiced at university teaching/research hospitals. Educational research being related to both behavioral science and to a practicing profession has always required these two different kinds of research practices and settings (though it has not always had them available).

Mention was made earlier also of both the "Eight Year Study" and the later wave of work which involved visiting university professors working with school district personnel. This form of research emphasized, even more than preceding work, real school settings and problems. This was "action" research, albeit carefully controlled in the case of the "Eight Year Study." It was carried out at a time when schools of education had become quite distinct entities and, progressively through the 1940's, as they had fewer and fewer ties with the behavioral and social sciences. Educational research became, very distinctly, the province of educational researchers.

The Course Content Improvement Program of the National Science Foundation represented a departure from this trend, in at least one respect, namely the rejoining of educational problems to discipline-based scholarship. There were not, as yet however, by the mid-fifties, large-scale research and development programs for education. That increased support for educational R&D was desirable was a motivation behind the passage of the Cooperative Research Act of 1954. The Act and its ensuing funds represented the first major entry of the federal government into educational R&D.

Ward Mason (Office of Research and Development Resources, National Institute of Education 1973) has noted the large part played

by the research and development community during World War II which resulted in markedly increased federal support. In 1940, *all* federal R&D expenditures amounted to $0.7 billion; by 1950, that figure was $5 billion. (The most recent figure for the time at which Mason was writing was 1973, during which year the federal government expended $17 billion for all R&D.) As Mason points out:

> By far the largest part of this expenditure has been related to national security. Successes in defense and space produced a growing faith in R&D as an effective instrument of technological progress. . . . Both CCIP (Course Content Improvement Program) and NDEA (National Defense Education Act) were intended to support education in fields considered vital to the nation's military and technological strength, but they also established important precedents for federal support of mission-oriented inquiry into other educational problems (Office of Research and Development Resources, National Institute of Education 1973, p. 8).

The initial funds appropriated under the Cooperative Research Act, in the late fifties, were for "targeted" research, research on education of the mentally retarded, curriculum improvement activities in several areas. By 1963, the definitions had broadened: there was funding for "research and demonstrations in the area of the education of handicapped children and youth" and "research in vocational education" (Bureau of Research, Office of Education 1969, p. 56). These two 1963 appropriations are for much broader areas — both in terms of activities funded and scope of the target populations — than previous research funded. This was the beginning of a move away from "project" support to more comprehensive, programmatic support.

Mason and Boyan (1968, pp. 190-202) discuss this period from the fifties through the early sixties and conclude that both those in government, as well as their non-governmental advisors, had formed three firm opinions about the results of the funding to date:

> First, they agreed that the Cooperative Research Program had stimulated qualitative improvement and quantitative expansion in educational research. Second, they noted that the results of the projects, and of most other educational

> research, did not lead directly enough or quickly enough to observable change and desired improvement in educational practice. Third, they observed that the results of small scale project research tended to be fragmented, non-cumulative, and inconclusive (Mason and Boyan 1968, p. 191).

This analysis of the situation was coupled with thinking about precedents in other, apparently related fields, i.e., R&D in agriculture, medicine, industry, and defense. It was decided that the impact of the Cooperative Research Act's program would be increased if:

- emphasis were placed on the *relationship* between knowledge production and knowledge utilization rather than on knowledge production alone;
- *multidisciplinary* teams of professionals were attracted to educational problems;
- *instrumentalities* were created to house, and to receive funding and oversight of, the research and development undertaken (Mason and Boyan 1968, pp. 191-192).

This thinking, then, led to the Office of Education's decision to fund research and development centers, organizations suited to the three desiderata above. These centers would be multidisciplinary. They would be "mission-oriented," i.e., comprehensively programmatic. They would establish linkages with a number and variety of educational departments and systems, while themselves housed on a college or university campus and there in touch with a number of departments in the related disciplines. In fact, *in toto*, it was expected that these new centers would:

- conduct basic and applied research, in the laboratory and in the field;
- develop educational products based on research findings;
- field test these products;
- demonstrate and disseminate, in a variety of ways, information emerging from the research and development activities conducted;
- assume nationwide leadership in the area of research and development undertaken (U.S. Department of Health, Education and Welfare, Office of Education 1963, p. 27).

As Ward Mason said, in retrospect, "This was an attempt to cover the waterfront; the centers were set up before the (regional) labs and were expected to do *everything*" (Mason 1974).

It was less than ten years between the formal entrance of the federal government into educational research funding at any level (The Cooperative Research Act) and the establishment of the Centers in Pittsburgh and Oregon. From small, targeted project support, the move had been to support for large, programmatic multidisciplinary work. And, the expectations regarding the results of that work were enormous.

The "Bureaucratic-Professional Complex"

Richard Dershimer was Executive Officer of the American Educational Research Association from 1964 to 1974, a ten year period during which the domain of educational knowledge production changed and grew rapidly. His reflections on those changes, coupled with his perception of the need to educate both agency bureaucrats and field-based professionals about each other, led to *The Federal Government and Educational R&D* (Dershimer 1976). In this book, he overviews what he labels the "bureaucrat-professional complex," how it grew and what its major problems have been and are. He was clearly in a position to see these closely.

His major argument is persuasive: the "complex," a dyadic one composed of those in sponsoring agencies and those in recipient organizations, is insufficiently formed.

> A complex functions best when each side pursues policies and programs that complement the other. This does not mean that the research community and the bureaucracy need to have the same goals; this is an unrealistic expectation. . . . But the essence of a complex is that there are common values and common objectives that can be used to keep the interests of both parties from becoming contradictory. . . . This was not the case with educational R&D in the 1960s. . . . The commonalities that characterize a complex were missing. The bureaucrats and researchers ended up by pursuing different policies (Dershimer 1976, p. 131).

This divergence in objectives stemmed, in large part, from the different backgrounds of the two major groups of participants. Their early educational training and later adult socialization were divergent, their reference groups were unique to each, their ability to communicate with one another was minimal. As the amounts of money available for knowledge production increased rapidly throughout the sixties, the professional research community exerted less and less influence on those policies which would shape expenditures. The bureaucratic community, composed in the main of career civil servants with long tenure in the Office of Education, were, according to Dershimer, largely "conscientious and dedicated" (Dershimer 1976, p. 14). But, the policies and programs they shaped were more an outgrowth of the norms, value and exigencies of federal government agencies than of the field over which they held sway.

The situation described by Dershimer was little affected by the creation of the National Institute of Education (see below). Consequently, he closes the volume with a number of recommendations (Dershimer 1976, pp. 137-143). They are as timely now as they were several years ago, perhaps even more salient as the new Department of Education takes shape.

Briefly, Dershimer recommends that:

- sponsoring agencies be staffed by people from the knowledge producing domain, in order to better ensure overlap in frames of reference and communication networks;
- those in the knowledge producing domain attend more seriously to policy formation, to information on themselves as a community, to communication among themselves;
- as more data are collected on the knowledge producing domain, greater attention be paid to *quality* assessment within it;
- finally, policy shaping be a matter of systematic and serious consideration, with state-of-the-art conferences more frequent as well as careful attention to possible future needs and lines of inquiry.

Again, this advice remains timely. A reason for that is the speed with which events — policies, organizational growth and proliferation, demands for problem solution — occurred in the past fifteen years. It is an overview of these which is now necessary.

1964–1979: Overview

Organizationally speaking, events moved fast and furiously. Between 1964 and 1967, ten research and development centers were established at universities across the country. To this group of institutions was added another in 1966, the network of Regional Educational Laboratories (RELs). The laboratories resulted from Title IV of the Elementary and Secondary Education Act of 1965 (ESEA) which, in turn, references the Cooperative Research Act, so that Title IV clearly was viewed as an extension of that previous effort (Bailey 1970, pp. 5–17).

In addition to the laboratories, there was an attempt, which failed, to establish a network of Early Childhood Centers and there was the successful beginning of several R&D centers for vocational education.

The Elementary and Secondary Education Act of 1965 is a model of the comprehensive and complex legislation that was drawn up throughout the mid-sixties in Congressional attempts to change quickly the status of American education. Testifying before Congress in 1970, Richard Schutz, Director of one of the laboratories, reflected on the expectations of only five years earlier:

> The enabling scaffold of the current national educational R&D program was constructed in the dream world context of the Elementary and Secondary Act of 1965. The vision was broad and expansive. Title I would provide quality education for the children of the poor. This would be done by purchasing the new and glamorous materials available from the "knowledge industry" via Title II. Since some difficulty could be expected in effecting major changes in schools without external stimulation, Title III would provide liberally for innovation and supplementation mechanisms. The scientific and engineering wherewithal to stoke the overall production would eventuate from the expanded R&D program and the new regional laboratories of Title IV. And finally, as protection that the new-found capability of the nation's educational system would not disrupt the historical State and Federal political balance, Title V would strengthen State departments of education to check the anticipated growth at the Federal level (Schutz 1970, p. 711).

In addition to the laboratories, Title IV also established the Educational Resources Information Center (ERIC) and its clearinghouses which currently number 17, making accessible informational reports on a variety of educational topics.

The Office of Economic Opportunity (OEO), established in 1965, also funded a large number of educational programs, under the rubric of "compensatory" activities. In this way, Head Start, Follow Through, and Upward Bound Programs came into existence. Also, this Office pioneered in sponsoring large-scale evaluations of its programs, a practice now considered essential to almost all federal education activities (Paisley, Paisley and Shapiro 1976). In 1970, Head Start was transferred to the Office of Child Development, and Follow Through and Upward Bound to the Office of Education.

By the end of the 1960's, the following agencies other than the two just mentioned were also engaged in funding large amounts of R&D, especially education related R&D:

- The National Foundation for the Arts and Humanities
- Appalachian Regional Development Commission
- National Science Foundation
- National Institute of Neurological and Communicative Disorders and Strokes
- Department of Defense (which has a long history of supporting educational research).

The first half of the seventies included two major reorganizations of legislation regarding education, the Education Amendments of 1972 and 1974. Under these, an Education Division was established within HEW and the National Institute of Education was established.

The National Institute of Education was the outgrowth of several years of debate over what came to be recognized as the necessity for a separate entity within the Department of Health, Education and Welfare devoted exclusively to educational R&D. Along with the creation of the Institute was the creation of a new role, the Assistant Secretary of Education, who oversees both the Institute and the Office of Education. The new Institute did not however find itself in charge of all educational R&D, as segments of the Office of Education maintained responsibility for R&D in handicapped and vocational educa-

tion and for the two Education Policy Centers (as well as other "R&D-like" programs). A more specific focus on the Institute follows in the next section of this review.

The Educational Amendments of 1974 created several new programs but are probably most interesting for their rather precise specifications of priorities and activities for educational R&D. What should be clear is that the time from 1964 to the almost present has been one of multiple initiatives, of simultaneous but not coordinated goal setting, even if only looked at within federal agencies sponsoring educational activities.

At the height of the enthusiasm for organization building in the mid-sixties, there were 20 regional laboratories, 10 R&D centers, and two vocational educational R&D centers. Today there are 18 institutions from this original set who are members of CEDaR, the Council for Educational Development and Research. In addition, two new university-based centers have been created. One for "the study of reading" has been established at the University of Illinois at Urbana-Champaign and another for "the study of teaching" has been set up at the University of Michigan. Current discussion includes an initiative to set up more regional laboratories, so that currently unserved areas of the country will have organizations in their region (Panel for the Review of Laboratory and Center Operations 1979).

It was noted at the outset that educational knowledge production is conducted in four organizational forms, or settings — by individual scholars, by university-based Centers, by non-university, non-profit organizations (such as laboratories), and by "for profit" organizations. The bulk of the discussion has centered on the first three of these forms. The fourth — including publishing houses, testing bureaus and independent research firms — is clearly evident in the field, but largely unreported, unanalyzed. In very recent times, some of these — e.g., the Educational Testing Service and related testing agencies — have begun to come under public scrutiny, even legislative attack.

Because the emphasis in this review is to be on social organizations for research, and because the Centers Program was conceived to be the organizational "answer" to knowledge production in education, we shall focus further discussion primarily on these organizations and the related Regional Educational Laboratories. Before getting more specific, a brief look at the major funding agency is called for.

The National Institute of Education

It is federal funding, in the main, which sustains knowledge production in those forms specifically designed for that purpose. Although as stated earlier, that federal funding is channeled through at least half a dozen agencies, the "lead" funding agency for education is the National Institute of Education. It is the lead one in the sense that it is the only federal agency whose mandate is *solely* to fund knowledge processes and products for the improvement of education.

Established in 1973, the Institute was authorized to fund and oversee educational knowledge production in the university-based centers, regional laboratories and a number of other individual and small group efforts. For Fiscal Year 1979, the budget of the Institute was $83.1 million (*Report on Education Research* 1979, p. 4).[6]

At that time and to the present, the Institute was organized into three major program areas: Program on Teaching and Learning; Program on Educational Policy and Organization; Program for Dissemination and Improvement of Practice. Each area is headed by an Associate Director who reports to the Director of the Institute. The Director is aided in program and policy planning by the National Council on Educational Research (NCER).

Within the three program areas, the distribution of the FY 79 budget was as follows:

Program on Teaching and Learning	$39.6 million
Educational Policy and Organization	18.5 million
Dissemination and Improvement of Practice	25.0 million

Looking at the funds distributed by the Institute to various recipients shows the following:

Type of Recipient	*Funding*
Colleges and universities	$28.9 million
Non-profit organizations	38.9 million
Profit-making organizations	5.3 million
State and local governments	8.1 million
Individuals and other	1.9 million

From its start, the Institute has had a bumpy history.[7] The first Director of the Institute, Dr. Thomas Glennan, left that post in Novem-

ber 1974, having done little to convince Congress of the Institute's ability. He was succeeded by Dr. Harold Hodgkinson, from June 1975 to March 1977, who, in turn, was succeeded by Dr. Patricia Graham, from September 1977 to May 1979. At present, while discussion centers around the new Department of Education and a reorganization of many educational funding units, the Institute is headed by an Acting Director, Mr. Michael Timpane.

Its frequent changes of leadership, and almost as frequent internal reorganizations, have created something less than a stable atmosphere within the Institute. However, the Institute itself was buffeted by its surrounding environment. Perhaps most salient is the Institute's need to justify a budget allocation on a yearly basis when many of the "returns" from the knowledge it funds cannot be expected in short order. Kowledge development and utilization frequently do not come to fruition within the confines, or according to the schedule, of the fiscal year. Further, this is knowledge production for education — a complex, fragmented, history-laden, politically active domain of American society. Therefore, injecting new ideas, procedures or materials into this domain is never a straightforward matter. This was an initial discovery of those who shaped the R&D Centers Program — the first large social organizations for knowledge production in education. It is time to return to that Program, to see what became of it specifically since 1964.

The R&D Centers Program and How It Grew: 1964–1979

The origins of this Program were, as described previously, in legislation passed in the late 1950's. The first two Centers, at Eugene, Oregon and Pittsburgh, Pennsylvania, were set up in Spring of 1964. Listed below are the Centers established, their dates of establishment (and closing dates where applicable):

Center	*Year*
1. Learning Research and Development Center *University of Pittsburgh*	1964–
2. Center for the Advanced Study of Educational Administration *University of Oregon*	1964–

3.	Center for Research and Development in the Study of Individual Differences *Harvard University*	1964-1968
4.	Center for Cognitive Learning *University of Wisconsin*	1965-
5.	Center for the Study of Evaluation *University of California at Los Angeles*	1965-
6.	R&D Center for Educational Stimulation *University of Georgia*	1965-1971
7.	R&D Center for Teacher Education *University of Texas*	1965-
8.	Stanford Center for R&D in Teaching *Stanford University*	1965-
9.	Center for R&D in Higher Education *University of California at Berkeley*	1965-1975
10.	Center for Urban Education *New York City (A consortium)*	1965-1966
	Became regional laboratory	1967-1973
11.	R&D Center on Social Organization of Schools *Johns Hopkins University*	1965-

In addition to these university-based, mission oriented R&D centers concentrating on various aspects of schooling and learning, there were four other university centers set up. The purpose of each of these was more focused:

1.	Center for Occupational Education *North Carolina State University*	1967-1975
2.	Center for Vocational and Technical Education *Ohio State University*	1967-
3.	National Center for Higher Educational Management Systems *Western Interstate Commission on Higher Education*	1967-
4.	National Program in Early Childhood Education *University of Illinois*	1968-1970

Central Atlantic Regional Educational Laboratory	1970-1973
Demonstration and Research Center for Early Education at Peabody University	1974-1975

As can be seen above, of the original eleven mission-oriented centers, seven remain. Of the original more focused centers, two remain. Two new centers, at the Universities of Michigan and Illinois (mentioned earlier), have been added.

Beginning in 1966, the Regional Educational Laboratories were established. The purposes of these institutions, which were in all cases non-university based, were to be two-fold: to assess the needs of the regions they served and to connect these regional needs to the knowledge being produced in the R&D centers. The establishment of the laboratories was the first tangible recognition that R&D centers could not hope to perform all the functions originally attributed to them.

> 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 . . . With Government encouragement, development came to be defined as the central functional emphasis, and in many cases the programs became more national than regional (Paisley, Paisley and Shapiro 1976, p. 39).

Of the twenty original regional laboratories, eight remain. A recent advisory group to the National Institute of Education, the Lab and Center Review panel, has recommended that the Institute begin to plan for the creation of new laboratories to serve currently unserved geographical areas of the nation (Panel for the Review of Laboratory and Center Operations 1979).

Most university centers and all regional laboratories are members of the Council for Educational Development and Research, a Washington, D.C. based organization. Each institution belonging to the Council

is represented by a delegate, frequently the institution's director, and from among this group the Council's Board and officers are elected. The Council maintains an Executive Director and small staff in Washington. This organization's primary activity over the years has been lobbying in Congress to secure and maintain funds for its member institutions. Its stipulated major function, coordination and communication among the various institutions, is one it has tried to facilitate in a number of ways — newsletters, substantive conferences, frequent delegate meetings, etc. However, because of the uncertainties of funding over the past several years, emphasis has been on economics and management rather than intellectual exchange. Further, the uncertainty of funding led to an atmosphere more of competition than of collegiality among many of these institutions, even though individual scholars within them are in communication and sometimes collaboration. In a stable, more secure funding environment, it could be anticipated that there would be an increase in substantive communication and exchange among member organizations.

Growth and Change in the Knowledge Production Capacity for Education

Despite the poor communication and coordination which currently characterizes the group of Centers and Laboratories as a whole, positive signs of system-like growth can be detected. These include: the development of new paradigms for educational knowledge production, or the extension of or borrowing from others of old ones; changes in standards of judgment; system-like growth and differentiation (Salmon-Cox 1978a; Holzner and Salmon-Cox 1977, pp. 88-100).

The R&D Center Program was intended not just to produce specific innovations, but to *impact* the field, the field of educational research and the field of educational practice. The idea was to provide structure, leadership, and new models and standards of judgment. Starting with this last, standards of judgment, there are some interesting indicators of the effectiveness of the R&D movement. Leaders of laboratories and centers, and other institutionalized knowledge producing organizations have made prominent new standards of quality in

applying scientific concepts and methods in education. For example, it is an unquestioned part of the R&D cycle that innovations — new curricula or other newly developed products — will be pretested, systematically developed, and evaluated, and that they will not be introduced simply on the strength of enthusiastic commitment. This emphasis on fairly specific conceptions of standards sets the knowledge producing reform movement in education apart from other efforts to improve American education as, for example, in the "free school" movement.

The systematic development of curricula, of tests, of instructional modules, of administrative innovations, has begun to have traceable effects within industry, publishing houses, and among schools of education, institutions training the next generation of teachers and scholars.

A salient characteristic of the knowledge production field in the past fifteen years has been the growing prominence of people in the forefront of the traditional behavioral science disciplines conducting work of relevance and importance to educational problems. It is these traditional disciplines, e.g., psychology, that are the custodians of standards and criteria of excellence in scholarship. And, it is through the increased presence of researchers from these fields that scientific standards have become the standards for educational knowledge production.

What is significant in these past fifteen years is the fostering of communication between the behavioral science disciplines and education. It is possible to see now the changes which have taken place, when one compares the Centers currently, with their representation from psychology and sociology and a few other disciplines, with the rather parochial nature of educational knowledge production, at the time the Centers were established.

It is an indicator of the better position of educational research, as an intellectual pursuit, that leading scholars in the behavioral/social sciences now address questions of reading instruction or the measurement of school program effectiveness in ways not previously undertaken. In addition, there is growing evidence of the influence of educational concerns on the basic disciplines, on the way questions are asked or research designs are framed. It is interesting also that there are areas in which the traditional experimental design may now be

seen by many as less than appropriate, e.g., in many studies of school effectiveness. Yet, the need to counter the experimental paradigm, and the attempt to come up with an equally rigorous if different design has, it is generally agreed, improved the quality of this whole area of research.

There are other structural changes as well. In this vein, changes in the organization and functioning of the American Educational Research Association, the professional organization which represents this field, can be taken as indicators of the effectiveness of the move to bring science to bear on educational concerns. These changes reflect changes in knowledge production in the field in general. As the field of educational R&D has grown, so too has the Association — in its membership, its number of divisions, its annual meeting attendance. Without enumerating these specifics, the important thing about the Association, as about the field in general, has been its growth and its differentiation. In the past decade, the Association has developed more and more specialized divisions, special interest groups, and a larger and more diversified set of publications.

The knowledge producing capacity for education has grown tremendously since 1964 and has, in fact, developed a strong leadership. It has developed a fairly differentiated structure, organizations of several kinds to meet varying needs: labs and centers, information systems, and field based programs such as Follow Through. More significantly, high standards and criteria of judgment have been set regarding scholarship and production.

Any analysis of the current state must mention the need for: including a greater variety of the social sciences in the knowledge production process; working to build more extensive communication between knowledge producers and school practitioners across the country; working to better communicate the significance of work past and potential to a larger segment of the American public. Yet, there are indicators of: (1) system growth; (2) systemic differentiation; (3) specialization as well as of growing leadership and, most importantly; (4) increased use of scientific standards of quality for knowledge production. These criteria are related both to the initial goals and objectives of federal involvement in educational knowledge production and to how one thinks about and characterizes growth and

development in a number of domains. The Centers Program, and the establishment of the Regional Educational Laboratories, have made possible this kind of maturing of the knowledge producing capacity.

This overview has not attempted to list or review the specific products of the Centers and Laboratories. That has been done elsewhere (National Institute of Education 1976).[8] Nor has it specifically addressed the question of the quality of the organizations involved. That, too, has been done elsewhere (Panel for the Review of Laboratory and Center Operations 1979). The discussion just preceding is as close to assessment as this reviewer chooses to engage in. Namely, the field as a whole has matured and shows those positive signs of growth that one would look for in a newly institutionalized knowledge domain.

Concluding Thoughts

While knowledge production for education has a long history, organizations for knowledge production are new. The functional requisities of such production are a constant, while the activities associated with the functions to be fulfilled will vary. (Discovering the correct question to pose will sometimes ensue from research, sometimes from development, sometimes from utilization.) At the present time, knowledge production is being pursued by individuals, small groups and large organizations. The armchair planner can even conceive of forms as yet untried. But the major point is that given the existing forms, a system-like configuration has emerged but with insufficient channels for coordination and communication.

Any review of the history of American education shows clearly enough the impossibility of centralizing the direction or content of schooling. It is a political, not an intellectual, impossibility. (Textbook publishers have for some time given more commonality to American education than many are aware.) It is no more politically nor intellectually desirable to centralize the direction of knowledge production. This is especially true in fields, e.g., the study of how children learn, so new that competing scientific theories hold equal and strong weight.

Rather what is needed at the current time is two-fold. First, there is a need for better understanding (on the part of all involved) of the nature of the knowledge production process. Research and development are

cyclical processes, each contributing to and being enhanced by the other, in a fashion which is characteristic of all efforts to improve professional practice through science and technology. There must be maintained a necessary balance between what is scientifically and technically feasible and what it is that society needs and demands. Certain times and particular kinds of problems necessitate large-scale product development. Other times, and for other kinds of problems, product development must await basic research, the discovery of new knowledge.

Second, there is an urgent need for coordination and further interchange among those already engaged. This interchange must occur more frequently both within the knowledge producing domain itself — between individuals, organizations, professional associations — and between that domain and those "leading" the enterprise from positions within bureaucracies, primarily federal. More conscious attention must be paid, by the professionals in the field, to the shaping of policies affecting them. More mutual education — of bureaucrats, of researchers, of practicing professionals — must be engaged in if problem solving strategies and problem definitions are to be communicable and rational to all concerned. A better mesh is called for between the view of those producing knowledge about what is feasible and important, and the view of those using that knowledge and funding that production. All of this would be vastly facilitated by a climate of some financial security. It could be aided as well by dynamic guidance from the major sponsors. It is necessary now that strong, articulate leadership emerge from within federal agencies: to encourage the use of what is now known; to enhance current knowledge production capacities; to anticipate the needs of the 21st century and, together with producers in the field, to seek to improve education for the next generations of learners.

NOTES

1. A most efficient overview of the development of the Bureau is contained in Gideonse's account in Bureau of Research, Office of Education (1969). This, in turn, credits Lawrence Cremin's work in L. Cronbach and Patrick Suppes (1969). The brief discussion here relies heavily on both of these reviews, as well as a few other sources.

2. This author was pleased to discover this linkage in one, quick reference as, at least in her reading, this is not widely reported. Discussions of mental testing and progressive education always seem to be couched in polarities, yet there are clearly some philosophical underpinnings which are similar. Discovering James at the root of each was a pleasant confirmation.
3. However, Cremin casts doubt on whether or not much that was scientifically controlled did occur (Cronbach and Suppes 1969, pp. 50–51).
4. This survey approach is related to similar monitoring/evaluation procedures developed and used in business settings at the time. As did people in other kinds of institutions, public school officials, too, began to talk of concepts such as "productivity," "return on investment," etc. The taking of a survey of pertinent information is one methodology suited to such concerns.
5. For example, the State of New York has recently passed controversial "truth-in-testing" legislation and other states may follow.
6. This figure and those to follow are from *Report on Education Research* (January 24, 1979, p. 4).
7. For an indepth analysis of the origins and first years of the Institute, see Lee Sproull, Stephen Weiner and David Wolf (1978). Also see Arthur E. Wise (1976).
8. Also available from the National Institute of Education are the regular Milestone Reports of all funded organizations, which cover research and development outcomes every six months.

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