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The seven papers contained in this monograph were presented at the Seventeenth UCEA Career Development Seminar held in Portland, Oregon, October 1967. Some papers view the problems of applying new knowledge to practice quite generally in the context of the broader society while others focus more sharply on strategies for implementing the utilization of knowledge in the context of educational organizations. Launor F. Carter and Norman J. Boyan discuss the general question of knowledge production and utilization in education. Specific roles and techniques which need to be developed are outlined by Egon G. Guba, Ronald G. Havelock, and Sam D. Sieber. Richard Schmuck describes two training event models dealing with the social psychological aspect of transforming behavioral science knowledge into effective practice in educational administration. Finally, Keith Goldhammer presents some thoughts on how preparatory programs should be revamped in light of the need for specialized administrators. (HW)

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Foreword

In October, 1967, the Center for the Advanced Study of Educational Administration (CASEA) and the School of Education at the University of Oregon hosted the Seventeenth UCEA Career Development Seminar in Portland, Oregon. It might be said that this seminar entitled, "Knowledge Production and Utilization: Role Emergence and Reorganization," provided an exploration of one fundamental assumption underlying the policies and practices of the University Council for Educational Administration since the inception of that organization. This guiding assumption has been that the practice of educational administration could be improved by applying theoretically and empirically supported knowledge to problems of educational organization, management, and leadership. The history of American education would suggest that knowledge production and the utilization of new knowledge have not universally been considered the appropriate and necessary means to improve educational practice. As David Clark noted in 1963, "The paths of school improvement have been directed toward the provision of more of what already exists . . . and the improvement of practice on the basis of what is already known."[1]

This Career Development Seminar was devoted to the presentation and discussion of seven papers which examined various facets of problems inherent in the application of knowledge to practice. Some of these papers view the problems of applying new knowledge to practice quite generally in the context of the broader society while others focus more sharply on strategies for implementing the utilization of knowledge in the context of educational organizations. Throughout the text the authors call for the development of new organizations, new roles, and new training programs to facilitate research and application of research findings in the practice of educational administration. Thus, the papers presented at this seminar tend to supply some concrete strategies relevant to the

[1] David L. Clark, "Educational Research: A National Perspective," in *Educational Research: New Perspectives*, ed. by Jack A. Culbertson and Stephen Hencley (Danville, Ill.: Interstate Printers & Publishers, Inc., 1963), p. 8.

implementation of a basic organizational goal of UCEA.

Although a consideration of strategies for the transfer of information appears to be the central theme of these papers, no real attempt has been made to integrate the papers into a unified document, and inter-relationships between and among the separate chapters are more implicit than explicit. An attempt *has* been made to order the chapters so that those which speak to the problems of knowledge production and utilization in a general way precede those which explicate more detailed suggestions for implementation of new roles and reorganization in education.

In CHAPTER 1, Carter describes four major studies which were concerned with the steps leading up to the utilization of new developments in the military, public welfare, and education. He then considers various aspects of information transfer as a national problem, but warns that, "While it is important to make the existing knowledge available to potential users, we need to recognize that the solution of the pressing problems of our complex culture will require much more than the intelligent application of the information and knowledge we currently possess." Carter concludes with seven recommendations about ". . . the proper role of knowledge development in our culture."

Boyan, in CHAPTER 2, agrees that the need for improved educational development activity is great, but cautions that educational research and development should be viewed as a collective concept and enterprise. Developmental activity he notes, ". . . creates a voracious demand for research output, as well as educational inventiveness. The stronger the conjunction in research and development, the more powerful will become the combined concept, and the greater the probability of enthusiasm on the part of public policy makers for each part of the concept as well as the combination." Boyan traces the history of government support of research and development in educational administration and then proposes a design for the creation of a network of institutions for inquiry, development, and the preparation of educational administrators.

In CHAPTER 3, Guba cites the lack of a "middleman" role between the knowledge producer and the user as a major problem in knowledge utilization. On the theory to practice continuum, which he describes, the activities of the middleman are seen as taking place in the development and diffusion stages. The importance of relevant evaluation techniques to both development and diffusion activities is stressed. Guba deplores the present evaluative methodologies and describes the characteristics of a successful evaluation strategy. He concludes that evaluation must be continuous throughout the trial period and treatment must be subject to continuous improvement in light of the results of evaluative data.

Havelock, in CHAPTER 4, focuses on the linking roles needed to retrieve basic or applied knowledge, derive practical implications from it, and distribute it to people who need it and can use it. He indicates what types of linking roles are most effective for what linking tasks, what characteristics and skills need to be considered in recruiting and training linkers, and what kinds of institutions need to be created to secure these roles and to make knowledge linkage a permanent feature of our national educational system. He includes a discussion of the two major problems in linking roles, "overload" and "marginality," and presents a prescription to overcome these problems in education.

In CHAPTER 5, Sieber posits four aspects of the public education system which he says distinguish education from other social systems. These are vulnerability to the social environment; the professional self-image and associated values of educational personnel; the diffuseness of educational goals; and the need for coordination and control of the primary clientele as well as of the employees of the system. After an analysis of these organizational attributes, Sieber outlines existing strategies for change and offers an alternative strategy—identified as the Status Occupant—designed to overcome the difficulties which arise from the dominant organizational characteristics of education.

In CHAPTER 6, Schmuck contends that despite the abundance of research knowledge available, little of that knowledge seems to influence the practice of a large number of school administrators. There is, he indicates, a need for a new technology of transforming behavioral science knowledge into effective practice in educational administration. Schmuck then proceeds to deal with one aspect of the technology. He outlines two training event models: one which focuses on the individual administrator's development and the other which involves the entire faculty of a school. Both training events are designed to assist the educator in transforming research findings into practical application in schools.

Goldhammer, in the final chapter, points out that implicit in the call for greater knowledge utilization in education is the need for administrators who are prepared for specialized roles in the schools. Programs for educational administrators must be designed specifically to train the educational leaders, the program developers, the diagnosticians, and the implementers needed in today's schools. Goldhammer presents some thoughts on how preparatory programs should be revamped to train the administrator as "the clinician who can deal effectively with educational programs as devised to achieve specific educational objectives."

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JOANNE M. KITCHEL

June, 1968
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CHAPTER
1

Launor F. Carter

Knowledge Production and Utilization in Contemporary Organizations

When I was asked to participate in this seminar sponsored by the University of Oregon and the University Council for Educational Administration, I was particularly pleased because the general problem of knowledge production and utilization is one of the major concerns facing the intellectual community. Not only is this a matter of investigation and discussion in education but the topic is pervasive throughout the scientific and technical world. It is particularly gratifying to be able to participate in a seminar devoted to a subject which involves so many people from education. In the long run, it is through improvements in the way we utilize new knowledge that a more fruitful culture will be developed. I have no doubt that those at institutions of higher education will play a prominent role in bringing about this rationalization in knowledge utilization.

Perspective on Priorities in Research and Development

Throughout the intellectual and government community there is active debate regarding the priorities in allocating this country's resources. We

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are supporting research and advanced development at a rate of somewhat over 15 billion dollars a year. Of this amount about 2 billion is devoted to basic research. The national space budget is around 5 billion and the sums being spent by the National Institutes of Health are slightly over 1 billion dollars. While these figures are large, they should be placed in the perspective of a gross national product in the order of 800 billion dollars. The amount spent on basic science in the United States is approximately one-third of one percent of the gross national product. It is argued that this is a relatively insignificant figure and that certainly a country of our wealth can afford these expenditures in the development of new knowledge. Yet, when these small pieces are added together, they become large and significant. More and more, Congress and the Executive Branch of government are asking about the proper priorities in our national expenditures in the knowledge production area.

In a letter to the editor of *Science*, Professor Weisskopf (1967) of the Department of Physics at M.I.T. says:

> The troubles of today are, to a large extent, caused by our insufficient efforts to create a society in which more people can partake in a life which is worthwhile, interesting, and significant. These efforts would become senseless if we begin to sacrifice some of the most active parts of our cultural life. In these difficult days, we must, more than ever, continue to support all that is positive and valuable in our civilization.

Interestingly, this statement was made in support of an increase in funds being devoted to basic science and, particularly, to the relevancy of the development of the new 200 billion electron volt accelerator now being authorized by Congress. The statement could have been used equally well as the prelude to support almost any worthwhile effort. It can be seen that it is not enough to merely cite the proportionately small cost, or the contributions to our cultural heritage, in trying to determine relative priorities in national spending. Rather, we will have to examine the various components of our total national economic budget and make a number of firm and rational judgments regarding the relative amount that will be spent in the various parts of the scientific and technical world. Indeed, various members of Congress have been highly critical of the Office of Science and Technology and the National Science Foundation for not having any well-stated plan of the priority of national spending in science and technology. At the last appropriation hearing, NSF was chided for this fact and its Office of Planning and Policy Studies has recently undertaken a serious examination of the priority problem.

But is it not just a question of the relative priorities in supporting basic and applied sciences. In addition, there is a question of the balance be-

tween the amounts that should be spent in support of basic work, applied work, and the utilization of the knowledge that is being developed. More and more we are seeing concern over the extent to which basic research has become a closed system in which new results lead to further questions, which then demand renewed or increased attention, which in turn completes the cycle of an expanding demand for research support. The promised practical utilization of results does not appear with the rapidity or clarity that members of the public expect. It is pointed out that for a number of years the space program has been supported at the 5 billion dollar level. Medical research has been supported at a 1 billion dollar level. Atomic energy development has been supported at a several billion dollar level. What has been the result of this support when evaluated in terms of practical utilization?

This topic has been the subject of much discussion and many seminars. With greater frequency the question is being asked as to whether the rate and size of investment can be justified in terms of national priorities as judged by the Administration, by Congress, and by the public at large. Particularly germane to this point is a recent discussion by Greenberg (1967) which says:

> Last June Lyndon Johnson wondered aloud about the payoff the public is getting from the government investment in basic biomedical research (*Science*, 8 July) and, since scientists are among the more insecurity-ridden wards of the Federal Treasury, a shrewd salesman might have prospered by offering mourning bands for lab coats. By late August, the biomedical gloom was such that NIH called in some 300 of its advisors from throughout the country to take home the message that the Administration is not disenchanted with basic research. But panic in the scientific enterprise, especially in time of tight budgets, is easier to inspire than to quell, and apparently the NIH meeting was not altogether soothing. Sensing this, Senator Fred R. Harris (D-Okla.), chairman of the Senate Government Operations Subcommittee on Government Research, decided to call a sort of summer conference on biomedical research policies. . . . If any themes emerged from among the 29 papers that were presented during the conference, they were these:
>
> 1. Federal policymakers recognize the value as well as the peculiar vulnerabilities of basic research, and they want to protect it from severe budgetary fluctuations and demands for rapid payoff.
> 2. However, the rationale for federal support of biomedical research is the prevention and alleviation of suffering, and, therefore, greater attention and resources must be devoted to efforts that directly help the sick.
> 3. Since resources cannot be obtained for investigating or exploiting every reasonable possibility in research and treatment, choices will have to be made, and these choices may involve decisions to support applied research efforts at the expense, in terms of manpower, facilities, and money, of basic research.

Technical industry, the government community, and universities have taken clear note of this concern regarding the extent to which work in the basic sciences or in the applied sciences has resulted in payoff to the larger community. Many studies have investigated the way in which knowledge is transmitted from the scientific community to the technical community in the development of new products and techniques. One slowly emerging conclusion is that outside of the particular military or space activity toward which applied studies are directed, there has been relatively little spin-off from the large sums being spent in applied military or space research. A recent study sponsored by NASA and done by the Denver Research Institute was reported under the title "The Channels of Technical Acquisition in Commercial Firms and the NASA Dissemination Program." (Greenberg, 1967a) In this study 62 different firms in four industries dealing with the production of electric batteries, printing and reproduction, industrial controls, and medical electronics were studied to determine the extent to which NASA-related technical developments had been available and influenced the production of products in these companies. Although there was considerable variation among the organizations studied, the major conclusion was that few, if any, of them are vigorously seeking to directly use the technical and scientific output of NASA or the other advanced technology developments being supported by the government. This is not an isolated study. The problem is widely recognized and is forcing government support agencies to give more active concern to the dissemination of newly developed knowledge and techniques and also to examine the flow of knowledge and information in the cycle from research to development to use.

From Research to Development to Use Revisited

At the February 1966 meeting of the American Educational Research Association I participated in a symposium on the functions and operation of the then recently instituted program of Regional Laboratories. At that symposium I read a paper titled "From Research to Development to Use." (Carter, 1966) I was surprised at the wide interest shown in the paper, and think it would be worthwhile to review here some of the points made in it. The original paper contains a description of three different major studies concerned with the steps leading up to the utilization of new developments. At the time the paper was written, the studies were just being completed and final reports are now available.

Project Hindsight

The first study has become known as Project Hindsight. (Sherwin, 1966, 1967) Since the Department of Defense spends about 1.4 billion dollars a year on basic research and exploratory development, it was interested in learning to what extent this expenditure contributed to the development of new weapons systems and the value which could be placed on the improvements resulting from these developments. Twenty different weapons systems were examined in detail to determine the various important events or specific technological developments which allowed the design and production of the new weapon system. Once an event had been identified, a team of investigators visited the individuals responsible for its perfection and interviewed them intensively regarding the scientific or technical origin and the environment surrounding the development of the particular event. A summary of the data allows a number of important generalizations:

1. It was found that nine percent of the events could be classified as science events while 91 percent were classified as technology events. In other words, the new capabilities which allowed for the development of these weapon systems derived from technological studies and applications rather than from basic science itself. The authors are quick to point out that this result does not show that science is unimportant but rather it points to the time scale involved in the application of science. They say in their report:

> It is clear that, on the 50 year or more time scale, undirected science has been of immense value. Without basic physical science we could scarcely have had nuclear energy or the electrical industry or modern communications or the modern chemical industry. None of our science events could have occurred without the use of one or more of the great systematic theories—classical mechanics, thermodynamics, electricity and magnetism, relativity and quantum mechanics. These theories also played an important role in many of the technology events. If, for example, we were to count the number of times that Newton's laws, Maxwell's equations, or Ohm's law were used in the systems we studied, the frequencies of occurrence would be so high that they would completely overshadow any of the recent events we identified. But, however important science may be, we suspect its primary impact may be brought to bear not so much through the recent, random scraps of new knowledge, as it is through the organized "packed-down" thoroughly understood and carefully taught *old* science.

This finding leads one to the almost inescapable conclusion that if a technical development is to take place and it is limited by current technology, then the way to solve the problem is to directly attack it in terms

of the then known science and advanced technology rather than to hope that basic science will, in any short time period, provide the new knowledge required to lead to a successful system development.

2. Another important finding was that of the various technological events—about 95 percent were directly motivated and supported by the Department of Defense. That is to say, that almost all of the events contributing to these weapon systems were developed and refined as a direct result of a perceived need in the development of the weapons system or similar weapons systems. Only very few events resulted from general technical developments or from technical developments outside of the weapon system area. This finding indicates that if a particular problem area is to be solved, the motivation and support must come from people working in that particular area rather than from the hope that spin-off from other technological developments will make an important contribution.

3. Another important finding of Project Hindsight concerns the time distribution of events. The time from which the development of a particular weapons system was initiated, to the time at which any of its required events became technologically feasible, shows a very wide range. Of the 700 events studied, the range in time was from 20 years before the weapons system was started through 10 years after it was started. Most of the events occurred before the weapons system was started—on the average, around 5 years before. Even so, many of the events were not available at the time a decision was made to proceed with the overall system and had to be perfected in parallel with the system development. On the average, the delay between the discovery of an event and its application was 9 years for science events and 5 years for technology events. This result implies that there is a considerable lag between the time that knowledge or a technique is developed and the time it is applied. Also, even though all the technology is not available at the time a particular system is started, the pressure of working on the system and having schedules to meet tends to force the development of missing events so that, by and large, a successful outcome is achieved.

I do not have time here to review the many detailed results of Project Hindsight but I believe that this is one of the most important studies ever undertaken of the process by which knowledge is put to use. The study indicates clearly that an orderly process from research to development to use is largely a myth and that, in fact, there is a great deal of crossing back and forth in terms of the development cycle, in terms of funding, and in terms of the people involved.

A case study of a successful development project but unsuccessful diffusion of the techniques developed

Edward Glaser's Human Interaction Research Institute (1967) has completed an interesting study for the Vocational Rehabilitation Administration. In this study they examined the factors which seem to have inhibited a number of vocational rehabilitation agencies from adopting the techniques and methods of a successful demonstration by the Tacoma Goodwill Industries in a project titled "The Development of an Occupational Evaluation and Training Center for the Mentally Retarded" (Vocational Rehabilitation Administration 308). The objective of the Tacoma Project was to demonstrate the feasibility of rehabilitating severely retarded young adults to a level of sustained employment. The population consisted of young adults between 16 and 30 who had measured IQ's between 50 and 75. In addition to vocational training, the workshop emphasized training in work habits and in the various attitudinal and performance characteristics which would make these people acceptable to employers. A team consisting of a psychiatrist, a psychologist, a nurse, a social worker, and a vocational specialist worked with the individuals trying to impart the necessary skills. As a result of this effort, 63 percent of the subjects were placed in jobs, with each person remaining on the job for a minimum of three months. Some of the individuals were retained in sheltered workshops but many were placed in competitive employment in janitorial, domestic, factory, and farm settings. Although the original project was sponsored by federal funds, the Tacoma Goodwill organization has been able to continue this work under local auspices. This study was completed in June of 1963, and the results were communicated through formal reports to VRA and distributed to a number of rehabilitation agencies. However, despite the successful demonstration by the Tacoma Goodwill Industries, no other organization was known to have adopted the procedures used.

Glaser and his associates studied the efficiency of various methods of communicating the results of this study. As a first step, a questionnaire was sent to 40 widely separate VRA-sponsored occupational training centers for the mentally retarded inquiring whether or not they were aware of the study and its results. Since very few knew of the study, they were sent reports and a special brochure on the study. As a second communication step, a representative of the Tacoma workshop visited a selected sample of agencies in the California area to communicate the Tacoma results to them. As a third technique, a conference and demonstration for 33 representatives of workshops was held in the State of Washington. In

addition to the representatives themselves, consultants from Human Interaction Research Institute, the VRA, Tacoma Goodwill, and the University of Washington participated in a discussion of the Tacoma Goodwill project. A fourth communication method involved direct psychological consultation to the management of various workshops. It was hypothesized that when an organization becomes involved in a self-examination of its goals, opportunities, ways of operating and its problems, it would tend to seek new ways to reach those goals. If a skillful psychological consultant were available to management, it seemed probable that the organization would be led to change more rapidly. To evaluate this hypothesis, a psychological consultant was made available for 15 day-long visits over a period of six months to each of five workshops.

As reported by Glaser and his associates, the major results of this investigation were as follows:

1. If promising research or demonstration findings are reported in easily readable, brief and non-technical form, and are widely distributed to potential users, the chances of their having impact and being used will be increased relative to reporting by a formal report.

2. If potential users of the research or demonstration attend a conference where they can discuss the innovation and see it in operation by a site visit, use of the innovative research or demonstration is significantly facilitated, especially if there also is an opportunity for the conferees to tell each other about their own innovative programs or practices.

3. If rehabilitation workers who have heard about and seen an innovative demonstration elsewhere are later visited in their own agency by a member of the demonstration project staff, that added increment of face-to-face communication on one's own premises and with one's own working group further promotes the use of the innovation.

4. Psychological consultation to management helps the organization change more rapidly and become more open to change.

A traveling seminar and conference for the implementation of educational innovation

The System Development Corporation was interested in testing the feasibility of conducting traveling seminars and conferences as a technique for increasing innovation in education. This program, supported by the U.S. Office of Education, has been described by Malcolm Richland (1965) under the title "Traveling Seminar and Conference for the Implementation of Educational Innovation." While Mr. Richland authored the report, a large number of people at SDC were involved both in conducting the seminar and conference and in evaluating the results. Much of the following material is quoted or paraphrased from the report.

The project had four major objectives as follows:

1. To conduct a survey of, and visitations to, school sites with outstanding innovations.
2. To implement and conduct a traveling seminar of some 120 educators to selected innovating school districts in four regions of the United States.
3. To conduct a conference on the problems of implementing tested innovations.
4. To perform research related to the testing of the field extension service concept in education.

Principal activities of the project included a traveling seminar in which four groups of approximately 30 educators each, representing four regions of the United States, visited selected schools where significant innovations had been introduced and in operation for at least one year. Immediately following the seminar, a conference of tour participants was conducted at SDC on the dynamics of educational change; approximately one year later, on-site visitations to the participants' own schools were implemented. The school visitation sites were analogous to the demonstration centers inherent in the field extension concept of the Department of Agriculture. Each tour was led by a well-known and respected educator ("outside change agent"), who was accepted by his professional colleagues as being especially qualified to interpret the experimental foundations upon which a particular innovation was based, if such foundations were, in fact, offered by the innovator.

These four tour leaders were responsible for conducting the tour, were involved in the selection of the sites to be visited by the traveling seminar, and made all the arrangements for the visits to the schools, including advance briefings to the officials of the schools involved.

The schools selected for visitation were ones that had successfully implemented various educational innovations. The emphasis was on new educational media, major changes in curriculum, innovative teaching methods, and new school organizational patterns involving the use of teachers' time and classroom space. The schools selected also represented different sizes and urban-rural characteristics in the geographic region. Each of the schools visited had at least one year's experience with the particular educational innovation involved. To give a feeling for the kinds of innovations observed, the eastern tour, visiting one school in Massachusetts and two in New York, was exposed to the following: Continuous Progress Plan; Lay Personnel on Teaching Staff; New Vocational Training Plan for Culturally Disadvantaged Students; New Curriculum Materials; Auto-Instructional Devices for Individual Study; and Flexible Scheduling.

The tour participants formed a somewhat heterogeneous group. A number of studies have shown the importance of the school superintend-

ent and the need for positive and effective leadership at this level. In addition, the representatives of the various formal echelons of education are important and their concurrence is often needed in effecting innovations. Therefore, the final composition of each tour group included 15 local administrators, 8 state education department officials, and 7 representatives from teacher training institutions. The tour itself lasted one week. Each group met on Monday of the week of May 11, 1964, was briefed by the tour leader, and then began the site visits. At the site they observed a particular innovation and discussed its advantages and problems with the teaching and administrative personnel. The team often met among themselves to discuss further the particular activity observed and then moved to the next site. The complete tour involved visiting at least three different schools in separate geographic locations.

Following the tour, the tour members came to Santa Monica for a conference on May 16 through May 19, 1964. This conference was attended by the tour leaders, the tour participants, and selected consultants and specialists from SDC. At the conference each of the tour directors gave a fairly extensive description of the innovations observed by each team, as well as a summarizing report of the problems associated with the innovations observed. In addition, there were various addresses by leaders in the field of education and people who had studied problems associated with the introduction of change within various organizations.

Although the participants in the seminar expressed great enthusiasm for the traveling seminar as a technique for observing innovations and for stimulating participants to try such innovations in their own school setting, a more careful evaluation of the results seemed desirable. This evaluation consisted of two parts. One was assessment of a large amount of anecdotal material, letters, discussions, etc. The easiest way to summarize this material, which is discussed at considerable length in the report, is to say that the participants seemed to be extremely pleased with the program, and expressed plans to attempt many innovations in their own school settings.

The second effort was to undertake a formal evaluation of the effects of the program. In this evaluation, 46 of the 60 participating school districts were used as the experimental group and 57 comparable districts formed a control group. Prior to the initiation of the tours, the superintendents of schools in both the experimental and control groups had filled out a detailed questionnaire concerning the nature of educational innovations in their districts. Approximately a year later each superintendent was visited, and participated in a structured interview regarding the school district and its innovations. Following the interview, the questionnaire

and interview material were assessed by SDC staff personnel, and degree of innovation was scaled on a 0 to 4 scale. Participating districts had a higher innovation score than did the nonparticipating districts. This change score was evaluated by analysis of covariance with the results being significant at past the .01 level of confidence.

A study of translating laboratory research in learning to operational settings

Since my earlier paper, Mackie and Christensen (1967) have published a report which is particularly relevant to education. This study was undertaken to describe the processes involved in translating the results of laboratory research in psychology into forms that would be meaningful and useful in operational settings. The investigation concentrated on experimental studies of the learning process, because of its obvious importance. In this investigation, selected studies of human learning were analyzed in detail and their findings were reviewed for possible practical application in Navy training. Also, the apparent impact of the findings of these studies on actual Navy training personnel and training practices were studied. Additionally, a number of well-known psychologists in the field of learning, in educational psychology, and in positions of responsibility for research on training were interviewed on issues that were considered vital to the translatability and applicability of research results. In reporting their findings, Christensen and Mackie say:

> It was found that the research-to-application process never has properly developed for the psychology of learning. Consequently, there have been far fewer applications and much less impact on the educational process than might reasonably be expected in view of the size of the learning research effort. The reasons are believed traceable, in large part, to the research philosophies of experimental psychologists. But it was evident, also, that potential users have been reluctant to make the effort necessary to realize the benefits of research findings . . .
> Research on learning processes represents, perhaps the largest single area of investigation presently being pursued by experimental psychologists. Although this has been true for some time, there has been no systematic effort directed toward practical application of the findings from learning research. As a consequence, modern learning research is producing very little impact on educational technology or training practice.

Some will think that the above quotation represents too harsh an evaluation of the results of years of experimentation in the psychology of learning. One can speculate what conclusion would be drawn from a similar study from various other fields in psychology and education. I suspect that a careful examination would show that much of the research

done in these areas has resulted in only fairly limited application in real life situations. It seems probable that the recognition of this fact was an important stimulus to the U.S. Office of Education in establishing the research and development centers and the regional laboratories. It is my belief that a successful program in the area of education will result only from very extensive and lengthy work on the part of these research and development agencies in intimate involvement with actual school experience in real-life school situations.

The four studies reported in this section have each contained many findings and recommendations. Although they come from different fields (the military, the welfare field, and education) their conclusions and results have a common core of implication for knowledge dissemination and the utilization of research. These broader implications will be considered in the final section of this paper, but first I want to discuss the information transfer problem.

Information Transfer as a National Problem

There has been increasing concern regarding the formal aspects of the information transfer problem. The results of basic and applied research and technological innovation are reported in numerous documents, journal articles, government reports, books, etc. The number of these and the difficulties in making them available for use have been increasing for years. This has been recognized at the federal level by a number of agencies. The National Science Foundation has established an Office of Science Information Services which has associated with it a Science Information Council. Also, the federal Council for Science and Technology has established a committee known as COSATI, the Committee on Scientific and Technical Information. Finally, within the last year, the President has appointed a National Advisory Commission on Libraries.

Two years ago I was fortunate enough to head an SDC team which had been commissioned by COSATI to undertake a study of the national problems in scientific and technical document handling. The results of the study have recently been reported in a book. (Carter et al., 1967) Within the limitations of this paper, I can do no more than give a quick synopsis of the book and hope that those interested in the total national scientific and technical document handling problem will be stimulated to read the entire book.

The first part of the book describes the present document handling system. There are chapters on document handling institutions, on the process of document flow and on document users. Another section is

devoted to a statement of some of the fundamental problems in document handling and the formulation of basic propositions regarding federal responsibility in this area. The next section develops various alternative approaches to solving the problems set forth in previous chapters and the final section evaluates the various alternatives and makes prognoses regarding future actions.

It is argued in the book that information is one of our most precious national resources. The information problem is much more than the local annoyances, inconveniences, and dissatisfactions with document information systems. It is argued that a natural resource such as knowledge and information is something with which the Federal Government must be vitally concerned and that it needs to guide the overall development and conservation of such an asset. From this perspective, the various problems currently facing the national document handling system are reviewed. Among the problems discussed are:

1. There is a need for the adoption of a fundamental statement of policy on the part of the Federal Government. It is suggested as a fundamental proposition that the Federal Government has the responsibility to assure that there exists within the United States at least one accessible copy of each significant publication of the worldwide scientific and technical literature.

2. There is a great increase taking place in the number of users and user requirements. It has been estimated, for example, that there will be about a 50 percent increase in the number of scientists and technologists in the next five years. It is estimated that there will be four million scientists and technologists by 1970, at which time they will represent 4.7 percent of the total work force.

3. A serious problem is the rapid increase in the number of documents. The number of books, journals, etc. doubles almost every 15 years. For example, it is estimated that in 1961 there were 658,000 technical documents published and that by 1970 this number will grow to 1,143,000.

4. Another problem is that the present system for handling formal documents is in serious trouble in its effort to render quality service. There are a number of evidences of this difficulty. For instance, the Library of Congress is having to greatly increase its bibliographic service to libraries, but even so only 50 percent of the various catalog cards required are available to major research libraries. Some libraries have large backlogs of documents and books which they are unable to process into their collections. Although libraries want to give service to all legitimate users, many are adopting restrictive policies regarding the services they render. The amount of trained manpower in the library field is far short of the demand and is not growing at as fast a rate as the growth of the general professional work force. Likewise, the budgetary situation for most research libraries is critical. Public libraries and school libraries are cur-

tailing services and stinting on staff because they cannot raise the money to maintain a desirable level of service.

5. Libraries have been very slow to adopt modern technology and computer techniques.

6. At present, the system of document handling institutions is composed of many independent units within the government, at universities, in professional societies, as private efforts, and in industry. These units have tended to go their separate ways in terms of local plans and resources. The need for an integrated long-range plan has only very recently been recognized and hopefully will be one of the outcomes of the recommendations of the National Advisory Commission on Libraries.

In view of the many problems just summarized, the study team reviewed the various plans which had previously been proposed for national document handling systems. Three new major organizational concepts were developed and evaluated at considerable length. One of these involved establishing within the Executive Branch of the government a capping agency which would set general policy and monitor the performance of various responsible agents—agents who would be directly involved in the operation of the many facets of a national scientific and technical document handling system.

As a result of the COSATI study and studies undertaken by the library community and other portions of the Federal Government, the President, in January, 1967, appointed a National Advisory Commission on Libraries. As a member of the Commission, I have been privileged to meet with the other members of the Commission, who represent a very broad spectrum of those concerned with the library and information transfer problem. There are representatives from major universities, from research libraries, from state libraries, from public libraries, from school libraries, from law libraries, and medical libraries. In addition, there are representatives from major learned societies, and from the lay public interested in library problems. In addition, a former Congressman who was instrumental in the passage of the Library Construction and Service Act is a member. It would be inappropriate to discuss possible recommendations before the Commission's report is made to the President. I can say, however, that the Commission has made an effort to tap all available sources of information. It has heard representatives from all the major professional associations concerned with libraries and document handling. It has visited some of the nation's leading libraries and has held hearings in a broad sample of localities throughout the nation. We are just now in the process of formulating our recommendations.

Even though many groups are working on the problem facing the formal information transfer mechanisms, it seems probable that even if they

were successful, we would still be faced with serious difficulty in implementing the knowledge which has been gained. Frequently, the knowledge available in reports is not easily translatable into practical application. Often the carefully reported results are so narrowly restrained or so confined to the laboratory setting that their implications for real problems are, at best, tenuous. While it is important to make the existing knowledge available to potential users, we need to recognize that the solution of the pressing problems of our complex culture will require much more than the intelligent application of the information and knowledge we currently possess.

Using Knowledge in Attacking Major Contemporary Problems

In this paper we first discussed the question of priorities in research and development and their place in the national scene. Second, we described four studies dealing with the problem of research to development to use. Third, we considered various aspects of information transfer as a national problem. Now, I wish to draw together these separate sections and to consider some new material which should give insight into the ways in which knowledge can be used in attacking some of the major contemporary problems facing our civilization. Many will not agree with the comments I am about to make. I hope that by stating some fairly dogmatic positions, I can stimulate discussion of these important problems and help those who disagree with the positions I have taken to examine the basis for their position. Thus, we can come to some agreed upon conclusions or directions for solution of the proper role of knowledge development in our culture. The points I wish to emphasize are:

Seek the solution within the context of the problem.

If a major problem area needs attacking, then the solution should be sought by work within the context of the problem area itself rather than hoping that knowledge developed in basic research or in other applied areas will have great application to the particular problem needing solution. This conclusion tends to place basic scientific research in a less central position than is often done in discussing ways of solving major problems. Although basic research and scientific theory remain fundamental ingredients to solving problems, the knowledge derived from basic research tends to be too general to guide the way for the solution of specific contemporary problems. This conclusion is borne out by Project Hindsight and the Mackie and Christensen study.

The solution to contemporary social problems will be complex and many faceted.

Simple solutions are extremely unlikely. If there were simple solutions to the various problems we are facing today, the problems would have ceased to exist long ago. Rather, these problems persist in spite of the efforts to apply common sense and straightforward approaches. All our experience shows that the solution to major system problems involves the application of many different developments and their integration into a concentrated attack on the problem. Again, one can cite the Hindsight experience where it was shown that the development of a major new weapons system depended on the solution to a large number of relatively well defined, small, but critical problems. Similar results can be cited from other fields. One of the great successes in America has been the revolution in agriculture. Recently, Sprague (1967) has reviewed the conditions necessary for agricultural production in the developing countries. He emphasizes the many factors which are essential for the successful introduction of high-yield crops. After reviewing the increase in rice production in Japan, he says: "As is typically the case, this increase in yield is the result of many factors: improvement in varieties, increased use of fertilizer, modification of cultural and production practices, and better control of disease, insect pests and weeds."

Certain critical conditions are essential for the successful attack on any major problem.

Prominent among these critical conditions are: First, there must be an appropriate acceptance and motivation on the part of the community, the government and other involved agencies in recognizing the need for a concentrated effort toward solving the problem under consideration. Second, there must be a trained, motivated and experienced staff available for long-term application to the problem. Generally, the problem will not be solved in any short period of time and those responsible must recognize that the same staff must be maintained over a number of years if the problem is to receive real attention and solution. Third, funding must be available not only to support the staff but often to make many physical and organizational changes within the setting in which the problem exists.

The concept of assessment is fundamental to solving significant problems.

It is surprising how frequently we resist the idea of assessment. We will

deplore some existing condition or state that a serious problem exists without being willing to undertake the necessary effort or even to recognize the necessity for a quantitative assessment of the existing situation. Further, such assessments must be based on rigorous and objective techniques. In weapons system development, specifications are worked out in great detail which define the various parameters which must be satisfied before the weapons system will be considered satisfactory. These specifications are clearly understood by the developer and the user. At times, almost as much money is spent in evaluating and assessing the weapons system as went into its original development. Frequently, modifications and continued development are required if deficiencies in the original design are demonstrated during the assessment phase. Similarly, we should not be satisfied with introducing ameliorative efforts in the social and educational areas unless we are willing to undergo the stringent test of objective assessment so that an evaluation of the effectiveness of new methods can be made and cost/effectiveness estimates derived.

A new profession of social or educational engineering needs to be developed.

In evaluating contemporary problems in education and the social area generally, it seems there is a wide separation between the practitioners in these fields and those engaged in research in our academic institutions. We do not have the middleman who, as in the case of the engineer, is devoted to solving specific problems. The engineer takes accumulated experience in technology and general principles of basic science and applies them to the solution of problems. His orientation is towards neither the development of basic new science nor the operation of a particular system but rather that of the designer, architect, and introducer of the new system. Such people are lacking in the education and social fields. The universities and government must take the initiative towards defining this new profession and training the people who will become its practitioners. Since contemporary social problems largely arise in the sector where government is primarily involved, that is to say, problems in education or in urban development or in environmental control, where there is a clear recognition of government responsibility, the social engineer needs to be trained to serve within a government-oriented context. Thus, the government, if we wish it to deal adequately with these problems, will need to encourage over a long period of time the training and employment of people in this new profession.

Simple solutions and instant experts are counter-productive.

It is my impression that there are still a large number of well-educated people who feel that somehow a simple solution can be found to most of our problems. Often these same people believe that if a good sensible person would just look into the problem for a short period, he would be able to perceive what needs to be done. A striking example of this phenomenon is the number of people who believe they are experts in the area of education and believe they know what should be done. In a recent issue of the *New Republic*, Joseph Alsop (1967) authored an article titled "No More Nonsense About Ghetto Education." On the basis of his short acquaintance with this subject, Alsop advocated that "brilliant Negro achievement" could be realized if the education world would only adopt New York City's "More Effective Schools" program. For those who are unfamiliar with educational developments, Alsop's article probably carried great conviction and no doubt led many to believe that here we had an example of the wise man coming up with a sound solution. It was with real pleasure that I read a reply by Schwartz, Pettigrew, and Smith (1967) in a subsequent issue of the *New Republic* titled "Fake Panacea for Ghetto Education." These Harvard educators were able to show the misinformation contained in Alsop's article, his rejection of much pertinent information, and his relative ignorance of developments in the problems of ghetto education. Yet, I venture that Alsop, because of his wide reputation as a syndicated columnist, has influenced many more people than the reply by the group of experts in the subject.

One long-range approach to this problem suggests that educators have a special responsibility to transmit an understanding of our contemporary problems in such a way as to insure that college graduates are reasonably immune to the idea that simple common sense solutions are the answers to most of our contemporary problems.

A special problem exists because of the nature of the gatekeeper in contemporary problem areas.

By gatekeeper, I mean the individuals and organizations which are essential to the solution of contemporary problems because of their strategic location in approving or disapproving particular solutions for these problems. I have in mind such gatekeepers as school boards, legislatures, city councils, planning commissions, etc. In the development of weapons systems, we have quite clearly defined gatekeepers. One of Mr. McNamara's great achievements has been his ability to establish respon-

sibility within the military services for clear decision-making and clear lines of authority as to whether or not a particular weapons system will be developed. Once the decision has been made to proceed with the development of a weapons system, the necessary budgeting, development plan, personnel allocation, industrial contracts, etc., follow. In these developments, the location of the gatekeeper is clear but, more importantly, the gatekeeper has a professional expertise in the subject about which decisions are being made. This may be a military professional background, a highly technical engineering or science background, or other background which is appropriate to the particular problem. In marked contrast, we often find that in contemporary educational and social problems the gatekeeper is not well defined. It is unclear exactly what body or institution is responsible for making a decision. Likewise, the person filling the gatekeeper role often does not have the technical or expert knowledge necessary to make the decision. Too frequently the gatekeeper in the education and social area occupies his position because of ability to win elections, general social affability, or business interest rather than a trained professional expertise in the problem under consideration. I do not suggest any simple solution to this problem but as time goes on we will have to try to better educate or to change the role of these gatekeepers.

In conclusion, then, I would suggest that this seminar serves a most useful purpose in focusing the highly important task of developing strategies for solving the many contemporary problems which our nation faces. It seems apparent that the utilization of knowledge is one of the important ingredients in coping with contemporary problems, but much more is involved. The whole problem of a strategy for change and the method of bringing together the necessary resources deserves our most serious attention.

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CHAPTER
2

Norman J. Boyan

Problems and Issues of Knowledge Production and Utilization

The juxtaposition of the terms *production* and *utilization* signifies that the central issue is improvement of the relationship between the two domains. The central problem is how to improve the relationship. These two propositions hold however we define knowledge, production, or utilization. They hold also whether we focus on education, on administration, or on educational administration.

What we mean by new knowledge requires clarification. Do we mean only the product of rigorous scientific inquiry, including humanistic, historical, and literary scholarship? Or, do we mean also the full range of innovative ideas that are untested and unevaluated? If we restrict ourselves to the narrower definition, we would deal literally with the relationship between *research* and practice. If we employ a broader definition, we would deal as well with the larger question of the openness of education to *change* in practice, irrespective of the demonstrated validity of *improvement* of practice attributed to or claimed for the change.

One way to encompass educational inventiveness with the product of inquiry is to treat them both as domains of hypotheses that require rigorous testing for their claimed contribution to improved practice. The

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products of educational inventiveness and of rigorous inquiry tend to share at least three elements in common. First, they appear in an undeveloped state. Second, they appear in forms which are not fully understood by and acceptable to potential users. Third, they seldom include specific provision for preparing or training the potential user to use the product wisely and well. These three elements constitute essential links in the relationship of the production and utilization of knowledge, narrowly or broadly conceived.

Recognition of the linkage problem is long standing. Students of the adoption and diffusion processes have offered over the years a number of hypotheses and findings about factors that influence the introduction and spread of innovations in educational institutions. Their essays and studies treat a wide range of independent variables. Most observers have restricted themselves to analysis of variability in factors which have been present. Only a few observers have asked whether essential elements may have been missing. The question of what is missing in the total process of converting knowledge into practice has turned attention to the potential power of educational research *and* development as a collective concept and enterprise.

Educational Development

The concept of development as an activity of great magnitude and great consequence has taken root slowly in education. There exists a relatively shallow and narrow base of tradition on which to build in attempts to invoke the concept and to give it body.

Examples of near fit include features of the major curriculum programs in the sciences and in mathematics that blossomed in the late 1950's and of scattered efforts in the field of structural innovation, such as the Flexible Scheduling Project at Stanford University. These examples share in common the goal of making educational ideas and inventions work. The developers in each instance assumed the responsibility for carrying their ideas to the drawing board to create specific materials and processes, taking them from the drawing board to the field for tryout, returning to the drawing board with the results of their field testing, returning to the field with more refined materials and processes, again and again. This iterative process both characterizes and constitutes an essential feature of developmental work.

In addition, these examples share in common the creation of multidisciplinary teams, who contributed over time and in concert the power of their expertise to the development of the new materials and processes.

These teams also attempted systematic assessment of the intended effect of the new materials and the new procedures, formatively and summatively.

Carefully designed and executed iterative work distinguishes rigorous developmental effort from the act of "selling" new materials and new processes to schools before they are appropriately field tested and before they are installed in pilot schools for additional reality testing and feedback. Educational development is a slow, demanding, exacting and extremely expensive process. It requires a multi-disciplinary assembly of talent, properly rewarded for devoting itself to this slow and demanding activity. It, therefore, must find a home and a base that will provide the climate, the tools, and the rewards necessary to sustain the effort.

The financial support and the hospitable climate for development in education have been marked more by their absence than their presence. The conventional curriculum-building exercises of local and state school systems, and the conventional preparation of texts and materials, hardly qualify as development work of significance when placed along side of the efforts of the Physical Sciences Study Committee or the School Mathematics Study Group.

Since educators have rarely understood the importance of educational development in converting knowledge into practice and since they have rarely appreciated its complexity and sophistication, they have never really supported it enthusiastically, either outside or inside of the institutions that have conventionally housed the educational enterprise.

As a result, the state of the art of educational development is low. Yet, it is hypothesized that the relationship between the production and utilization of new knowledge in education will be materially strengthened only when educational development emerges as a well supported and highly rewarded domain of activity. At this point in time, however, it is still a hypothesis rather than demonstrated fact that educational development is the keystone in the relationship. Rival hypotheses need to be constructed and tested before one draws too strong an inference from scanty data about the power of development as an explanatory variable. The connection between production and utilization is complex and requires analysis of a style and character in keeping with the territory. More than likely, multivariate type analysis is needed to help explain and to understand the relative contribution of several factors in improving the relationship. Probably no one factor can explain enough of the variance in enough cases to permit a single, simple-minded inference.

Nevertheless, observation of what has occurred in instances where serious, sophisticated, and extensive developmental work characterized the introduction of a tested innovation strongly suggests that educational

development is a necessary, if not sufficient, condition to improving the relationship between the production and ultilization of new knowledge. The relative rates and scope in the adoption and diffusion of the "new" mathematics and science, as compared to other content and structural innovation, represent cases in point.

As an activity in its own right, development can build both on a base of educational inventiveness, or hunches, and on the foundations of earlier, rigorous inquiry or scholarship. This inventiveness, these hunches, and imaginative ideas also constitute part of the storehouse of knowledge, broadly defined. Even so, research capital and competence, narrowly defined, constitute essential pillars on which to rest a dominant portion of serious developmental work. It is in this sense that the notion of educational research and development, collectively considered, is likely to emerge most powerfully, assuming that the developments appear in forms that are understood by and acceptable to intended users and that the users are specifically trained to use the developments wisely and well.

The Federal Interest in Research and Development

One of the most vigorous and hopeful protagonists of educational research and development, in its connected denotation, is the federal government. The growth of its interest represents a crucial factor in any current examination of the relationship between the production and utilization of new knowledge in education and in the administration of education.

The birth of the new interest occurred in the mid-1950's. Signal events included the National Science Foundation investments in building new curriculums in mathematics and science and the National Defense Education Act provisions to support programs in guidance and foreign languages. The bulk of the federal investment went to the support of education as an instrument of national policy in international affairs. The public rationale behind the new programs rested heavily on the importance of our educational system in the maintenance and enhancement of our international posture. However, the soil was turned and the seeds were sown for expansion of domestic investments when the climate turned favorable. This turn of climate came with the convergence of the dreams of the New Frontier and Great Society and the demands of the Civil Rights Revolution. Both of these influences focused attention on the domestic scene; both called for the use of education as an instrument to pursue a wide array of national goals.

The Cooperative Research Act also appeared in the mid 1950's. It

provided an unparalleled impetus to the support of research in education in universities, and especially in schools of education, across the land. In addition, private corporations invested heavily in education in the decade from 1956 through 1965, with more emphasis on encouraging educational inventiveness and educational innovation than research *per se*. These investments in inventiveness and innovation, coupled with the work sponsored by the National Science Foundation and NDEA, contributed to and fed on an acceptance of change in education. Innovation was "in."

Innovation in education was not, however, a hallmark or outcome of research projects sponsored by the Cooperative Research Act. It is not surprising, therefore, that someone should ask, after some ten years, "What has the $100,000,000 Cooperative Research Act 'library' contributed to change in and improvement of educational practice?"

This question helps to explain the current posture of the federal government with respect to educational research *and* development, in the connected sense. Without raising publicly any serious questions about the quantity and quality of work supported by the Cooperative Research Act, federal policy makers and program managers turned to the question of the relevance and applicability of the results of the investigations to educational practice. Once this question assumes priority, quality takes second place to relevance. Contribution to knowledge, *per se*, is less important than the contribution to improving educational practice and solving educational problems of national significance.

R & D centers

The establishment of the research and development center program in 1964 marked a major leap by the federal government in support of problem-oriented educational research and development, deliberately connected. The decision to start this program clearly signalled intention to seek another alternative in addition to project research conducted by individual investigators and small teams, for systematic attack on and resolution of educational problems of national significance. It was a matter of some import to support development as a critical element in devising and applying solutions, with "research" funds. The program also took a calculated risk in placing heavy responsibility for development in university settings, where the reward system has traditionally placed highest value on the production of knowledge without reference to its applicability.

Establishment of the research and development centers in a limited

number of universities prompted expressions of concern among some members of the research fraternity who viewed the center program as a competitor for scarce resources. Still, the program went forward on the grounds that it was necessary to stimulate systematically the pursuit of research and the development of new alternatives, based on research, that would contribute to the solution of critical educational problems and the improvement of educational practice.

ESEA of 1965

Hard on the heels of the establishment of research and development centers came the passage of the Elementary and Secondary Education Act of 1965. The ESEA of 1965 contained a vast range of aspirations and intentions. Its several titles were categorical, but as a total bill, it contained provision for strengthening education at many levels, in many institutional settings, and along many routes, including the training of personnel.

Titles I, III, IV particularly bear on the problem of how to improve the relationship between the production and utilization of knowledge in education. Title I and Title III claim the lion's share of ESEA funds. Together they present a heavy demand on the capital of research and educational inventiveness. The demand appears to have exceeded the supply and to have revealed that existing capital needs much additional processing before it can be used.

Title I addresses itself primarily to the alleviation of educational deprivation. It assumes that increasing and improving educational and related services to children who live in pockets of poverty will make a difference in their educational progress. It assumes, also, that sufficient knowledge had been produced and that sufficient developmental effort had been expended to permit the immediate installation of educational services that would make a difference. Time will tell whether Title I will achieve the results that its architects intended. Even now, however, there is reason to believe that provision for significant and time-consuming development efforts might have generated more powerful educational inventions. The expectation of immediate results made it difficult to undertake needed developmental work, rigorous field testing, and appropriate and specific training of educational personnel to use new materials and new procedures in major programs of compensatory education.

Title III presents a somewhat similar picture. Originally, Title III envisioned a vast array of supplementary education centers and exemplary educational programs, to serve as the cutting edge for improving educa-

tion at the local level. It assumed that the supplementary components and exemplars were sufficiently well known and identified to allow immediate incorporation into school systems and to permit immediate display for others to emulate.

Experience suggests that the storehouse of immediately exportable and utilizable supplements and exemplars was not as rich as originally believed. Thus, a number of Title III projects were forced toward the boundaries of educational development. The need to turn in this direction rather than to draw from a rich treasure of demonstrated educational developments speaks eloquently of the state of educational research and development.

Title IV amended and extended the Cooperative Research Act. It authorizes educational research and *related* activities, including development, demonstration, dissemination, and training. It is in Title IV, particularly, that one meets head-on the policy and managerial considerations that affect the production of new knowledge, the utilization of new knowledge, and their relationship.

Title IV itself does not specify the proportion of funds to go to the various purposes for which the Title exists. As an extension of the Cooperative Research Act, it provides for continuation of support for project research by individual investigators. On the other hand, as the umbrella for research and development centers, it also provides support for programmatic research and development in education. In addition, its legislative history reveals that Title IV also provides the conceptual and fiscal foundations for a new institution, the regional educational laboratory.

Together, the research and development centers and the regional educational laboratories represent deliberate creation of instrumentalities to pursue educational research and development aimed at problem solving and improvement of practice. They constitute a new apparatus for producing and utilizing new knowledge in education. As new instrumentalities, the centers and laboratories also represent alternatives to the project research route. They do not, however, exhaust all possible routes for the production and utilization of new knowledge, considered separately or collectively. The breadth of the Title IV's authorization permits policy makers and program managers to keep open the range of alternatives which are or may become available. Still, the centers and the laboratories do comprise a large existing network addressed specifically to the relationship between the production and utilization of new knowledge in education. And, integral to both sets of institutions is the centrality of educational development as a major activity.

Inquiry and development

As to the inquiry phase of research and development, there is general agreement that both quantity and quality should be increased. There is no real issue here, except to find ways and means to accelerate the pace of improvement. The problem is how to do so.

Who really supported research in and on education before the period of enlarged federal investment is not well documented. In any case, since the passage of the Cooperative Research Act, the fate and destiny of the production of new knowledge in education have become inextricably wedded to the policies and actions of the federal government with respect to the support of rigorous inquiry and sophisticated scholarship. It is not surprising, therefore, that the issue, as seen by the educational research fraternity, is that the federal government should support research in education more strongly and more abundantly. The more successfully the fraternity pursues the issue, the more dependent will be the inquirers on federal policy and its execution; and the more interested they will become in continuing their efforts to influence federal policy. The problem is how to create an argument that appeals to policy makers and program managers who participate in allocating public funds. How powerful a case can be made for inquiry for its own sake? What priority should exist for supporting inquiry *qua* inquiry as compared to programs which aspire to or promise direct application or utilization of knowledge?

It is instructive to note, on this score, that the standards of productivity applied by institutions which house the inquirers, and by their peer groups, do not square with the standards of productivity applied by policy makers and program managers. In the former instance, the relevant question tends to be, "How good is the research?" In the latter instance, the relevant question tends to be, "What difference does (or can) it make?"

The scholarly inquirer may show great impatience, even disdain, in the face of the latter question. He may consider it irrelevant. And, indeed, it may be irrelevant to the institution which employs him and to the company of equals which constitutes his reference group. However, the question is not irrelevant to the fraternity of inquirers as a total fraternity. The more evidence of difference that *some* (not all) inquiry makes, the more likely that there will be enthusiasm for support of inquiry for its own sake. Few policy makers and executives really expect *all* inquiry to pay off in difference in practice. But they do expect that *some* inquiry will pay off. As they see evidence of benefit, they tend to become more enthusiastic in their support.

Given the benefits orientation of public policy makers and program

managers, it appears essential to demonstrate that some (not all) inquiry can and does contribute to the improvement of practice, that inquiry does make a difference. It appears essential to turn the attention of some inquirers (not all) to inquiry that is oriented to problem solving, that is designed specifically to contribute to improvement in practice. Some inquirers are already so oriented; some are not. Some are some of the time, but not all the time. And some apparently can be attracted to problem-solving, at least some of the time.

Here, again, development as an activity promises to contribute significantly. Development is an openly benefits-oriented activity. But, development also creates a voracious demand for research output, as well as educational inventiveness. Heavy investment in educational development, then, augurs well not only for improving the relationship between the production and the utilization of knowledge, but also for increasing the base of demand on and for inquiry *qua* inquiry.

The interest and support of the educational research fraternity in development as a valued activity should be clear. Its benefits orientation, its dependence on and consuming appetite for the fruits of inquiry *qua* inquiry, and its critical connection to the domain of utilization all combine to make development an extremely important enterprise for the educational researcher. The stronger the conjunction in research and development, the more powerful will become the combined concept, and the more probability of enthusiasm on the part of public policy makers for each part of the concept as well as the combination.

Inquiry in Educational Administration

Research in educational administration received strong stimulation from the Cooperative Program in Educational Administration, supported by the Kellogg Foundation. The Cooperative Research Program of the U.S. Office of Education, other public resources especially in major state universities, and private foundations have continued the initial stimulation.

These stimuli prompted an accelerating shift from the normative to the theoretical and empirical analysis of administrator, and more recently of organizational behavior in education. Also, students of the economics and politics of education turned with vigor to the conceptual and methodological tools of relevant social sciences.

In spite of the growth of much interest, and some competence, in research in educational administration over the last 15 years, it seems that educational administration remains more a *site for* inquiry than a well-

developed *field of* inquiry. If continuing observations confirm this view, a question of the first order is whether additional alternatives for improving inquiry in and on educational administration deserve further exploration.

Current alternatives for improving research in the field include: first, attempts to raise the level of preparation for inquiry of students enrolled in educational administration programs; second, attempts to secure and maintain the active participation of investigators trained as behavioral or social scientists; third, attempts to combine the first and second alternatives. A decade or so of efforts devoted to the first alternative has produced little increment in the research capital in educational administration beyond a low hill of doctoral dissertations and an even smaller mound of publications based on these dissertations. Available evidence suggests that a severe discontinuity enters into the career history of the majority of students of educational administration between completion of their dissertations and their ascendancy in the academic ladder to the professorship. This observation does not hold for all professors of educational administration, but even at the most prestigeful institutions, it characterizes the mode of behavior. In sum, remarkably few professors of educational administration, whatever their preparation, conduct and publish their own research.

The record of investigations by researchers trained as behavioral and social scientists is better. Most of the major contributions have come from them, except perhaps in the special field of educational finance. Compared to the output of scientists trained in relevant disciplines, attempts to increase the production of new knowledge in educational administration by way of improving the competence for inquiry of students in educational administration programs look puny.

Perhaps not enough time has elapsed to make firm judgments about the long-range power of new preparation programs that stress inquiry training and scholarly productivity. It may be that another generation of student output will demonstrate completion of the transfer from the normative to the scientific orientation of educational administration. It may also be that more rigorous application of university reward and value systems to professors of educational administration will accelerate the pace of the transition.

Existing data do, however, prompt the question of whether a department of educational administration (or its equivalent), conventionally located in a university school of education, constitutes the most promising base for encouraging inquiry in educational administration or for preparing researchers in the field. To date, the conventional structure has

not produced sufficiently to warrant great confidence in its ability to meet these tasks.

The experience of the Kellogg years led to several noteworthy efforts to depart from the conventional structure, including the School Executive Studies program at Harvard, the Midwest Administration Center at Chicago, and most recently, the Center for the Advanced Study of Educational Administration at Oregon. The University Council for Educational Administration also grew out of the Kellogg stimulation to educational administration, but more on this score later. The Institute for Administrative Research at Teachers College represents another structural variation, but one that sprang from a base separate from the Kellogg investment. Collectively, the record of these institutions offers evidence that a new structural design may contribute powerfully to improving the production of new knowledge in educational administration.

Suppose one were interested in creating a new institution whose primary goal would be to increase the quality and quantity of new knowledge in educational administration. Where should it be located? How should it be staffed?

Given the goal, a major university would provide the most compatible setting. Given the major domains of inquiry—the politics and economics of education and relevant extra-organizational and intra-organizational variables—the core of investigators would come from a background of training in relevant disciplines rather than from a background of training in educational administration. To provide continuous contact with and entry to the field, however, it would be desirable to include a cadre of investigators who came out of preparation programs in educational administration, but programs laced with substantial study and use of the concepts and tools of the behavioral and social sciences.

A mix of these types of investigators would probably prefer to work in an organization set up separately from a school or department of education. And they probably would prefer to think in terms of long-term rather than permanent association. The organization would then provide permanent posts, but not permanent incumbents. The principle of selectively structured turn-over would prevail.

There is probably need for no more than five to ten such centers or institutes across the nation. Partly this is so because of the realities of optimal staffing. Partly it is so because educational administration, as a site of inquiry at this point in time, needs no more than five to ten major centers addressing themselves to the territory on a *continuing* basis of the highest quality.

This suggestion for a new design smacks of a return to the CPEA model

of a few, major regional centers spread across the nation. To say so openly is not to apologize. It is to advocate the position that the CPEA pattern provided a thrust for inquiry in educational administration which was unparalleled prior to its creation and which has not really been matched since. This is not to say that the CPEA structure was perfect and that it could not be improved or strengthened. Associated with the proposed centers of inquiry should be a network of units or arms that would concentrate specifically on developmental work in educational administration. Movement of personnel from the centers of inquiry to the units of development should be open and easy. Each developmental unit should be closely connected to all of the inquiry centers rather than to just one center. The development units would be avowedly problem- and benefits-oriented. They would create insistent and consistent demand for problem-oriented inquiry, which would command the attention of some of the investigators at the research centers on the basis of interest and competence. Their mission orientation, rather than their research orientation, would cast the development units more in the mold of the new regional educational laboratories than in the mold of traditional university patterns. Some of the development units might be organizationally united with some of the research centers, but there would be no need for all of them to be so organized, nor for all of the research centers to create their own developmental arms.

Administrator preparation

Perhaps the most controversial feature of the proposed design, however, is advocacy for reducing to 20 or 25 the number of institutions in the nation that prepare educational administrators and for urging them to concentrate unabashedly on preparation for practice rather than mixing preparation for practice with preparation for inquiry. If for no other reason, this suggestion deserves consideration because it would permit experiments in training with larger classes of full-time students that might generate conclusions on what makes a difference in training.

The way things stand now, with programs scattered over hundreds of institutions, with students coming and going at all hours and at all times, no one will ever really be able to say very much about what makes a difference in training or why.

From these fewer, larger, and more adequately staffed centers of preparation, appropriately endowed and interested graduates could go on to the research centers or development units for additional preparation for specialized roles in the field of educational administration.

The time is ripe to join again the issue of whether there are too many

marginally equipped institutions involved in administrator preparation. The new Educational Professions Development Act may provide an appropriate opportunity to do so. In any case, the current status of inquiry in educational administration, as well as the current status of preparation programs for researchers and practitioners, demand examination and creation of new alternatives beyond more of the same to move the field forward. In addition to the pieces of structural apparatus proposed above, two others appear desirable. The first is creation, first advanced by Albright (1962), of three or four equivalents to the staff and command schools maintained by the military. This type of institution promises to be uniquely suited to the needs of educational administrators in mid-career, who have used up the intellectual capital of their original preparation and who are moving into positions of increased responsibility and scope. The second is creation of one or two extension-type centers in each state, or in regions if population is sparse, to serve as outlets for bringing new ideas on a continuing basis to practicing administrators in the field. The staff and command school equivalent might well be associated with a research center piece of the total apparatus. The extension center equivalent might be sponsored by administrator's associations or one of the teaching institutions.

If these pieces of apparatus remain scattered and structurally disconnected, there is probably no more hope in the proposal than there exists in current arrangements. Consequently, a great effort needs to be addressed to establishing a real network in which and to which all of the separate pieces contribute in a specialized yet highly cumulative fashion. The one previous effort to achieve a goal of this consequence proved to be abortive; yet, it carried the field forward. The old issues need to be reopened, and the new issues faced, to permit the next step to be taken.

The Developmental Component in Educational Administration

Reliance on conventional and traditional approaches characterize the majority of efforts to connect the production and utilization of knowledge in educational administration. Classroom instruction by professors dominates the scene, supplemented by workshops, consultation, surveys, text writing, and journal publication. Serious and continuous developmental efforts of consequence are virtually nonexistent, except perhaps in the specialized field of educational finance. As in education generally, so in educational administration it is not enough to explore ways and means to improve the quality and quantity of inquiry. There is need also to

discover how to strengthen the totality of research *and* development, in both their separate and connected senses.

Earlier reference to the desirability of creating specialized development units for educational administration reflected this central thesis. There are several major spheres of developmental work that come to mind as immediately feasible. The first is the development of curriculums for the preparation of administrators; the second is the development of organizational forms or structures for educational systems that are likely to make a difference in the way the systems carry out their tasks; the third is the development of administrative processes and procedures.

UCEA has represented a major force in curriculum development for preparation programs for educational administrators, in its own headquarters and in its member universities. Still, curriculum development in educational administration today looks very much like the conventional local school system approach. It is disparate, fragmented, uneven, scattered, and mainly non-cumulative. Nor can anyone really say much about what difference it has made. Certainly there is evidence of more use of behavioral and social science concepts and research findings in educational administration courses and workshops. However, there is preciously little evidence available about the impact on practice of the increased turn of educational administration to the social and behavioral sciences over the last 15 years.

A singular exception to the prevailing pattern shows itself in the UCEA sponsored work on the Jefferson School District simulation and associated in-basket materials and, more recently, on computer-aided instruction. The contributions to date of the UCEA sponsored efforts prompt consideration of expanding this type of work on a massive co-ordinated scale of the order undertaken by PSSC, SMSG, and BSCS. One way to mount such a development program in curriculum would be to assemble in one place for as long as a year just one professor on leave from each UCEA institution for the sole purpose of building at least two or three alternative curriculums for the preparation of educational administrators. Clearly, it would be desirable to mix into the team a substantial core of specialists from relevant behavioral and social sciences and another core of practitioners who are intimately familiar with the field. And it would be desirable to provide continuity in the developmental work through assignment of some staff on a long-term basis and opportunity for others to return regularly for summer sessions or equivalent blocks of time.

The goal of an effort of this magnitude would be to prepare complete instructional systems, including specifications for entire programs, content and materials, teaching procedures, and provision for training in-

structors specifically to use the new materials and procedures. The building blocks for a sizable chunk of this effort already exist, but they are scattered in bits and pieces over a wide landscape. Their assembly, and cogent additions to them, into several alternative instructional systems constitute a next order of business. It would be especially valuable if these instructional systems were truly field tested before advocacy of adoption in raw form. It would be all the more powerful if there were only a relatively few preparation institutions into which the instructional systems required installation so that something definitively useful could be said about the effects of administrator education and training.

With respect to new structural and organizational forms, it would be equally desirable to move from the posture of advocacy to the posture of creating, testing, and installing them in ways that are likely to demonstrate credible differences. The primitive stage of this type of activity already exists in the survey movement. Hardly a survey has ever been made that did not recommend one form or other of school or school system reorganization. The assumptions, convictions and beliefs on which these recommendations rest fall under the heading of conventional wisdom. Carefully designed and executed field testing in pilot situations is not a hallmark of the recommendations of survey teams. Even more to the point, seldom have the survey recommendations themselves been treated as hypotheses, followed by careful data collection and observation to ascertain whether or not the intended outcomes were achieved.

Schools and school systems are complex formal organizations living in complex social, political, and economic environments. As total systems, or as sub-systems of larger systems, they represent extremely difficult places in which to introduce elements of new form or structure to field test as part of an iterative and long-term developmental effort. For this reason, if for no other, provision for pilot and demonstration schools and school systems, of representative types, would need to be closely associated with the developmental units recommended earlier. The ability of the Flexible Scheduling Project at Stanford and the IDEA network out of UCLA to create such arrangements reveals that schools can be recruited for long-range developmental involvement. The various school study councils spread across the nation may also constitute fertile soil for similar involvement.

In addition, given the general difficulty of securing access to school systems for development work of a structural character, continued effort should be addressed to constructing simulated models which will permit approximate testing of the effects of structural changes. These models will probably always fall short of the real thing, but they do offer great

utility for "de-bugging" the crucial fine points that can make or break a serious development effort.

The domain of administrative processes and procedures also stands ready for major developmental attack. Decision-making, for example, has commanded attention for years as a crucial slice of administrator behavior. Several significant projects in computer-assisted simulation models have already appeared in prototypic form in other fields. These models may not fit educational administration, but they deserve careful examination as a potential base on which to build.

Beyond the simulation stage lies the opportunity to develop specific programs which provide both for training school executives in various styles of decision-making deemed appropriate to varying sets of conditions and structural form and also for testing these styles in action. As things stand now, training for improved decision-making consists primarily of didactic encounters, sometimes supplemented by participation in in-basket exercises. Computer-assisted simulation may move training one notch higher in the scale of reality. Properly constructed and supervised internship, encompassing reality and authenticity (themselves uncommon), may raise the level even higher. However, to further advance decision-making as an administrative skill, appropriately constructed and executed field testing of several models of decision-making in the real world of educational administration appears essential.

Conclusion

Emphasis on the importance of development as an activity of great consequence in no way deprecates the importance of other building blocks in the relationship between the production and utilization of knowledge. These other blocks, such as credible demonstration and sophisticated dissemination, constitute critical elements in the total set that makes for sufficiency in promoting and improving the relationship. The burden of the argument here is that development is the keystone. When it achieves a higher status as a rewarded and valued activity, the central issue will be joined squarely and the central problem will be moved closer to solution.

Reference

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CHAPTER
3

Egon G. Guba

Development, Diffusion and Evaluation

More than a decade ago I was a self-styled "expert" in the area of administrative staff relationships. My colleague at the University of Chicago, Jack Getzels, and I strove mightily to put the terms "nomothetic" and "idiographic" into the vocabulary of every practicing administrator in the country. I recall that we made a lot of speeches on the subject, Jack and I, and usually there was a question or discussion period following. Almost inevitably this comment would come from someone in the audience, "What you say seems to make some sense, although I'm not sure I really know what you're talking about. Why don't you fellows come down out of your ivory tower and tell us about your ideas in language that we can understand? How about showing us how to apply those ideas 'on the firing line'?"

"Well," we would say, "practice is hardly our concern. We don't know what the practical problems are. It's up to you administrators who have to deal with these problems every day to make the application. And as for not understanding our language, well, you can hardly fault us for that. If we are in the ivory tower, then you are surely in the basement. If we should descend so as to speak your language, why don't you ascend and meet us at least halfway up?"

Thereupon the discussion would end in an impasse. The listeners would

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go away feeling that they had been led to the trough but kept from drinking, because the theoreticians had failed to say anything that made operational sense to them. "If applications are to be made," they would ask, "who is better able to make them than the minds that developed those ideas in the first place? It is only because they are uncooperative that we can't use what they have discovered."

We, the speakers, would go away equally disillusioned, feeling that we had been pouring the water into their open mouths but that they had refused to drink. "For who," we would ask, "should be better able to appreciate and apply what we have to say than the men who are daily involved with the very problems we have been analyzing? It is only because they are lazy and ignorant that they won't use what we have discovered."

And so, to point the moral, the uncooperative researcher-theoreticians and the lazy, ignorant practitioners would go their own self-satisfied ways, each convinced that the fault for any lack of communication lay with the other.

Now I recall also that when I made these speeches on the nomothetic-idiographic theme, I would usually start my remarks with the observation that I had never been an administrator myself and never hoped to be one. But about a half-decade after this time, I suddenly did find myself an administrator, not of a school system to be sure, but of a bureau of educational research and service, with a staff about the same size as might be found in a middle-sized school. I had the usual "honeymoon" and then my problems began. One day, perhaps six months after I had taken office, I suddenly sat up in my overstuffed administrator's chair and said, "Why most of my problems are being generated by people. People are no damn good!"

It was just at that point that the full significance of a farewell card that had been given to me by the staff associates in the Midwest Administration Center when I left Chicago hit me. "If you're so smart," it read, "why aren't you rich?" Or to quote from another idiom, the phrase "Physician, Heal Thyself" came home to me with a new forcefulness. How was it that a man of such great theoretical expertise in the staff relations area should suddenly conclude that people are no damn good? No use to claim that I couldn't understand the theoretical language—I had helped to invent it![1] No use to claim that practice was hardly my concern—I was up to my neck in it! What then was my problem? Why was I having so

[1] The terms "idiographic" and "nomothetic" were picked from Roget's Thesaurus by me one wintry afternoon when I had nothing better to do than to try to find some new and interesting terms to use in our theory. We justified this at the time by claiming that we had to find terms "untainted" by value connotations.

much trouble applying the ideas that I had myself helped to formulate?

The answer to the latter question was some years coming, and has two parts, I now believe:

1. There is a tremendous gap between knowledge production and knowledge utilization that cannot be spanned *either* by the producer or by the utilizer himself, or even by these two acting in concert, at least in the typical situation. New mechanisms and agencies using special techniques are required to perform this bridging or linking function.

2. Knowledge is at best only one of a number of input factors in any practical situation. No practical problem can be solved using knowledge alone—a whole host of economic, social, political, motivational, cultural, and other factors must be considered.

Let me illustrate these two points with some examples. First, in relation to the gap between knowledge production and knowledge utilization, education seems to be literally centuries behind other areas of endeavor in recognizing the gap and in making provisions for its reduction. In the physical sciences, for instance, engineering activities were instituted for precisely this purpose. Consider the Bell Telephone Laboratories as an agency for knowledge production and the Bell Telephone system as an agency for knowledge consumption and application. Now a great deal of knowledge production, commonly called basic research, goes on in the Bell Laboratories; to cite one instance, much of the research in solid state physics leading to the discovery and development of transistors was conducted there. But it is a long step from developing transistors as a laboratory curiosity, however exciting their potential might be, to utilizing the transistor principle in building better dialing and switching equipment. No one expects the scientists in the Bell Laboratories to make such applications; indeed, if anyone were to suggest it, the idea would be thrown out on the grounds that scientists would be diverted from what they do best and turned to a task that they could do but poorly.

Instead, AT&T in its wisdom has interposed a vast organization between the knowledge producers and the ultimate consumers. This system, known as Western Electric, has the unique mission of making the applications and producing the ultimate devices which the various Bell systems will install and use. Western Electric has its own coterie of engineers, who are themselves divided into specialties. Some of their personnel are concerned with developing prototype applications; others with testing these out and debugging them. Still others are concerned with designing

these applications in ways that will make their production feasible and economical. And finally, of course, there are production specialists who actually turn out the devices that will be installed and used by the Bell Telephone companies.

This whole system seems to us only right and natural when we think of the physical sciences. But in education, even if there were good and plentiful basic research findings, there is no mechanism similar to the Western Electric Company, unless the R&D Centers and/or the Regional Educational Laboratories eventually assume this function, to carry on the intermediate functions of development, testing, and production. And as my original example indicates, as recently as a decade ago this lack had never even crossed our minds; instead, we were content to write off the research-practice gap as stemming from the uncooperativeness of the researchers or the laziness and ignorance of the practitioners, or both.

Let me dwell now for a moment on the second part of my answer to the question of why there is so much difficulty in applying new knowledge, *viz.*, that knowledge is, at best, one of a number of input factors in any practical problem situation. Let me use a real even if somewhat absurd example. In one school district I know about in the hills of Appalachia all of the power is held by the president of the Board who happens also to be the town physician. He has always controlled enough Board votes to hire and fire superintendents as he pleases. But this physician has one great vice: he is a morphine user. Now as a physician he had easy access to morphine and was able to provide himself with all that he needed to support his habit. But recently the state drug authority discovered his vice and relieved him of his license to prescribe narcotics. Hence he has had to turn to other sources for his supply, in this case, the local county health officer who is also his close personal friend.

Now it happens that the incumbent superintendent has somehow displeased the Board president, a failing that has cost the jobs of all of his predecessors. But the incumbent has one trump card: he happens to be the nephew of the county health officer. Hence the physician is faced with the difficult choice of firing the superintendent and losing his supply of narcotics or retaining the superintendent and having to put up with his nonconformist tendencies. A Hobson's choice indeed!

If we could find a candidate for the superintendent's job in this district who had ready access to a supply of drugs, great things might be accomplished. The incumbent is not in this happy situation, and every action he takes will have to be examined in terms of its potential for upsetting the delicate balance of power that presently exists. Get the physician too angry and he may decide that he can find some other source of drugs after

all. If new knowledge is to be inserted into this school system's workings, it will have to be able to survive this scrutiny.

My colleague, Henry M. Brickell, has put the case more eloquently than this homely example illustrates. He says:

> When research-based information does exist, it must take its place beside all the other information available. The research finding may coincide with and confirm the other information. In such a case, the chances of its being used are good. Or it may be the only source of information on a specific topic, in which case its chances of use are possibly only fair because it is not substantiated by experience. Or it may conflict with other information, in which case the situation is one of competition.
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> In the United States even today, research findings do not compete well against such established, persuasive information sources as one's personal experience or knowledge of what other schools are doing. For example, when a local school asks, "What might we adopt to solve our particular problem?" a very limited number of solutions (at best) generated through a research and development process compete for its approval with a larger number of solutions which have been generated without benefit of research. The prospective adopter is not likely to select the research-based solution solely because it stands on a base of scientific knowledge, especially if something else is *less expensive, easier to install, preferred by the faculty, or otherwise attractive.* (Italics added.) (Brickell, 1967, p. 235.)

Let me call your special attention to the very last part of that quotation, which asserts that research-based solutions to educational problems are not likely to be selected if they are in competition with other solutions that are less expensive, easier to install, preferred by the faculty, or otherwise attractive. Mere knowledge, Brickell seems to be saying, is not enough; there are other economic, feasibility, and motivational factors that must be taken into account. And he might well have added social, political, cultural, and psychological factors as well. Whoever and whatever it is that will bridge the gap between knowledge production and knowledge utilization will have to be sophisticated enough and shrewd enough to assess these factors and be able to cope with them. In general I would assert that the typical researcher surely, and probably the typical administrator, do not have the special training and equipment for this purpose.

The Theory-Practice Continuum

If my analysis is correct, so that special mechanisms and agencies will be needed to fill the enormous gap between knowledge production and knowledge utilization, where are these to come from and what will their nature be? To deal with these questions I will need to digress for a

moment to describe to you the categories of a theory-practice continuum which my colleague, David L. Clark and I have developed and published in other contexts.[2] I would like to begin by defining the various phases of this continuum and then proceed by discussing certain of their relationships.

Clark and I have talked about four phases or stages in this continuum, viz., *research*, *development*, *diffusion*, and *adoption*. Our concern today is with the middle two of these four, but I believe it is important to distinguish them from the other two, with which they are sometimes confused.

Research has as its basic objective *the advancement of knowledge*. The researcher is not concerned, nor should he be, with whether or not his research has an evident practical application. He needs freedom to pursue his ideas wherever they lead; he needs to be free to fail on occasion; he needs to be free from pressures for an immediate payoff. Research provides one input for the next phase, development.

Development has as its basic objective the *identification of operating problems and the formulation of solutions to those problems*. The developer, unlike the researcher, is most acutely concerned with practice. It is his job to make practice conform to the highest ideals that can be set for it, to be constantly probing the system to determine what, if anything, is keeping it from functioning at its best, and then to devise new approaches and techniques to ameliorate or eliminate whatever problems he may identify. In devising such problem solutions the developer borrows heavily wherever he can—from research, from experts, from his own experience.

But development implies more than just coming up with an answer. The answer must be one that will work in the real world. It must be one that can be adapted into the system. It must be one that is usable by the personnel available. It must get results. Thus development involves production, engineering, packaging, and testing a proposed problem solution or invention.

Diffusion has as its basic objective the *creation of awareness about new developments and the provision of opportunities for their assessment along whatever dimensions practitioners may deem necessary*. The most potent solutions that men can devise to overcome their problems have little utility if practitioners are not informed about them, or if they have

[2] See, for example, our papers, "An Examination of Potential Change Roles in Education," NEA-CSI Seminar on Innovation in Planning School Curricula, Aerlie House, Virginia, October, 1965; and "Effecting Change in Institutions of Higher Education," UCEA International Inter-Visitation Program, Ann Arbor, Michigan, October, 1966.

little opportunity to discover how the solutions work. Diffusion, in short, makes the solution available and understandable to the practitioner.

Adoption has as its basic objective the *adaptation of a development to the local situation and its installation therein.* This is by no means an easy task. Every situation has its own peculiarities, so that it is unlikely that a newly developed problem solution, an invention, as it were, can simply be slipped into place without considerable modification to itself, to the system, or to both. Further, no prudent local administrator would agree to such an installation without some kind of previous trial. When the development passes this test there is still the matter of assimilating the invention as a component part of the system. This assimilation may involve the training of local personnel, modifying available space, arranging appropriate scheduling, and the like.

I have found it instructive, in thinking about these four stages, to develop a taxonomy of activities at each step that indicates what the researcher, the developer, etc., actually do. Again, we may consider each of the four phases in turn.

Research

It will be sufficient for present purposes to classify all possible research activities into four categories which I shall term *depicting*, *relating*, *conceptualizing*, and *testing*. This taxonomy, (FIGURE 1) is not generated in any systematic way but emerges from the following chain of reasoning:

Figure 1

RESEARCH ACTIVITY
DEPICT
RELATE
CONCEPTUALIZE
TEST

When a researcher approaches a new topical area about which little is known, there is little that he can do other than describe the phenomena of interest. This description may take either qualitative or quantitative form. So, for example, a researcher might describe a group as being composed of both boys and girls, or as consisting of 67 percent males. I shall use the term *depict* to refer to such a general description.

After a sufficient amount of depiction takes place it becomes possible

for the researcher to *relate* depicted entities. So he may note that lipstick is worn exclusively by females, or that seven out of ten females wear lipstick while zero out of ten males wear it. He may also note that cancer of the lung seems to be related to cigarette smoking or that the correlation of height and weight is 0.71.

A sufficiently developed network of relationships makes it possible to suggest reasons for them. Why do certain phenomena tend to occur together? Why is lightning always followed by thunder? These questions lead directly to *conceptualization*, which we may regard as attempts to account for the observed depictions and relations.

These efforts at explanation may be *tested* to determine the validity of the conceptualization. To the extent that hypotheses are borne out, the formulation may be regarded as valid. In this testing process many of the same techniques used in the depicting and relating stages may be used again; typically, however, experimental methodology is employed which tests the hypothesis in a context-free (*i.e.*, controlled) environment while holding the possible effects of other factors in abeyance.

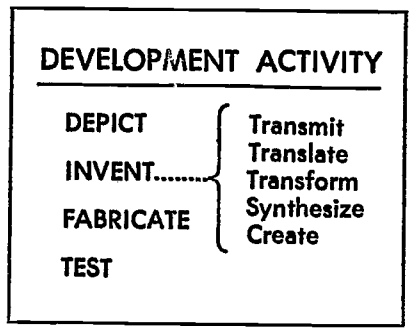
The reconstructed logic of the research process is thus as follows: The aim of research is understanding. Understanding may be said to be achieved when a theory or taxonomy permits an explanation of the phenomena of interest, and of the relationships they bear to each other. Theories are built initially from systems of depictions and relations. The presence of the imperfect theory so devised makes possible more refined conceptualization. Further tests will confirm or deny the validity of the refinements. The four steps of depicting, relating, conceptualizing, and testing, successively repeated, will thus produce a very sophisticated science over time.

Development

Development activity may also be conveniently broken down into four categories which bear a curious similarity to the four categories of research. I shall term these development categories (FIGURE 2) *depict, invent, fabricate, and test.* They are derived by the same sort of intuitive logic as are the research categories.

Development begins with the identification of problems. The developer is concerned with causing practice to conform to the highest ideals which he can imagine, but of course it never does. Certain desirable objectives are not reached, while other goals, perhaps even undesirable ones, are in fact attained. Those desirable goals which are attained may be achieved only imperfectly; there is always room for improvement. Whole new goals may become apparent for which the system makes no allowance,

Figure 2



or older goals once considered important become less so. All of these factors require some alteration in the system. The developer's first job is thus to *depict* the state of affairs so that needs and problems can be identified.

Problems call out for solutions, and the developer's next task is to *invent* them. Now invention may take a variety of forms. First, it is conceivable that a solution already exists and simply needs to be applied. So, for example, a reading problem at the first grade level might be solvable through the adoption of the initial teaching alphabet (i/t/a). Perhaps a direct analog is known and simply needs to be adopted, e.g., teaching reading to blind children might be accomplished by adapting i/t/a to braille. Possibly an indirect analog exists which can be converted into usable form, *e.g.*, a reading program for teaching adult illiterates in the military might be transformable into a new introductory reading program for culturally disadvantaged youngsters. Or, the elements from which a solution may be devised may exist but may need to be appropriately combined to yield a solution; thus, several extant reading approaches may be combined to yield a relatively new approach. Finally, it may be necessary to invent a solution *de novo*, as was apparently done in the case of the initial teaching alphabet in the first place. We may speak of *transmitting*, *translating*, *transforming*, *synthesizing* and *creating* to describe these five different possible ways of arriving at a proposed problem solution.[3]

The fact that a solution is identified by whatever means does not signify that it is ready for application. Merely hitting upon an idea like i/t/a does not make it possible to begin using it at once. Materials have to be developed. These materials must be combined into appropriate sequences.

[3] The three terms *transmit*, *translate*, and *transform* were used by the Committee on Research Utilization of the American Educational Research Association to describe three ways in which research findings can be moved into practice. The terms have a somewhat different connotation here.

The technique must fit into other ongoing school activities. I will call all of these operations taken as a whole *fabrication*; the term is intended to cover the entire gamut of engineering and packaging phases that may be required to make the invention "market ready," as it were.

Finally, the proposed solution must be *field tested.* It was devised to overcome some problem; does it in fact succeed? Does it work according to specifications? Should some refinements be made? Questions of this kind can be answered only through a comprehensive trial. And this trial must take place in authentic school situations; otherwise the applicability of the findings to the real world of education is dubious indeed.

The reconstructed logic of development is thus as follows: the developer, through a continuous monitoring of operational data (akin to process control), identifies particular operational problems which require solution. He invents a solution by transmitting, translating, or transforming already existing solutions, by synthesizing solutions from known but previously uncombined components, or by creating solutions *de novo.* In all of these processes he may look to research for guidance but research will be but one of several competing inputs. The invented solution is engineered into usable form, and finally is tested in a real school situation. Its use is then warranted in the schools.

Let me digress here to make clear a fundamental distinction between research and development, two processes which are often confused. There are several reasons for this confusion. First we are often tempted to describe what I have here called "research" as "basic research," and what I have called "development" as "applied research." This formulation gives the impression that research and development are simply different ends of the same continuum; indeed, someone has suggested that basic research is simply applied research with a time lag. But to commit this error is to ignore the fact that research and development have entirely different objectives; they are complementary processes to be sure, but they serve different goals.

A second reason for the confusion is that persons engaged in research and development often are seen to be using similar techniques. Thus similar instruments, design, field procedures, and data processing methods may be observed. But surely we will not fall into this trap; to do so would be akin to saying that because plumbers, carpenters, and masons all use hammers they are all doing the same thing.

A more pervasive and compelling reason for confusing research and development stems, I believe, from our intuitive understanding that the gamut of activities embraced by each tends to begin and end in analogous operational modes, just as our taxonomies of research and development

both begin and end with the same terms: depict and test. I have juxtaposed the two taxonomies in FIGURE 3 to make this clear.

Figure 3

RESEARCH ACTIVITY	DEVELOPMENT ACTIVITY
DEPICT	DEPICT
RELATE	INVENT
CONCEPTUALIZE	FABRICATE
TEST	TEST

The crucial differences between these two phases may be delineated by going back to the basic purpose or objective of each activity. The researcher depicts much as a painter depicts: he attempts to discover the salient elements in the situation and then to portray them in their appropriate relationships and contexts. The developer depicts not to *portray* the process but to *monitor* it, to discover problems in their still incipient stages and thus to be able quickly to counteract them.

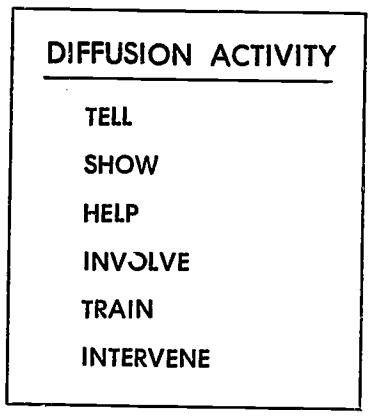
The researcher tests in order to *verify or refute his hypotheses.* It is imperative in his testing that he maintain rigorous control over all elements so that only those that enter specifically into the hypotheses can interact. It is in this way that we investigate the law of gravity for example, and can show, under conditions of a vacuum, that a feather and a stone do indeed fall at the same rate. Thus we establish universal laws. The developer is not concerned with controls, however. He does not need to know what happens to a stone and a feather under idealized conditions but in the real world. When he develops a solution to a problem it must be clear that it will work not only in the best of all possible worlds in which everything irrelevant can be constrained but also in the worst of all possible worlds in which everything irrelevant is free to contaminate. We shall return to this problem in our later discussion of evaluation; for the time being let it suffice to demonstrate that the testing of the researcher is not different just in degree or time from the testing of the developer but in fundamental intent.

Diffusion

The activities in which a diffusion agent, or diffuser, engages are those that are involved in bringing a proposed problem solution or invention to the attention of someone who may actually use it in practice, and those involved in giving that practitioner the opportunity to assess the operating

qualities of the invention. A taxonomy appropriate to this range of activity is shown in FIGURE 4. There seem to be essentially six ways in which the diffuser may operate:

Figure 4



1. *He can tell.* Telling involves the word. The word may be written, as in newsletters, papers, monographs, books, articles, and the like; or it may be spoken, as in conferences, speeches, conversations, etc. My essential diffusion mode today is, obviously, telling.

2. *He can show.* Showing is a form of communication which involves a direct confrontation with the phenomena of interest, as in a planned or casual observation, or in actual participation. It may involve structured experiences such as demonstrations or simulations; or it may involve looking at materials or displays such as pictures, slides, films, dioramas, realia, and the like.

3. *He can help.* Helping consists in the direct involvement of the diffuser in the affairs of the practitioner but on the practitioner's terms. It may take the form of consultation, service, trouble-shooting, and the like.

4. *He can involve.* Involving takes the form of an inclusion or cooptation of the practitioner. Thus the diffuser may enlist the practitioner in assisting with the development, testing, or packaging of an innovation; in acting as a "satellite" or agent to diffuse the invention to others; in contributing the problems to which innovative solutions are to be sought; and the like.

5. *He can train.* Training takes the form of familiarizing practitioners with the features of the proposed problem solution or invention, or of assisting them to increase their skills and competencies or to alter their attitudes. It may be accomplished through formal university credit courses, institutes, workshops, internships, apprenticeships, extension

courses, local in-service training, "T-group sessions," and similar experiences. Training may involve telling, showing, helping, and involving but differs from these other techniques in that the practitioner makes a formal commitment to learn by allowing himself to be trained.

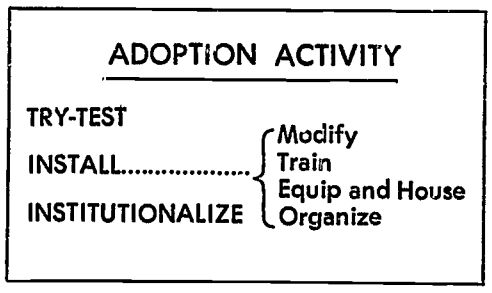
6. *He can intervene.* Intervening consists in the direct involvement of the diffuser on his own terms, not those of the practitioner. It may take the form of mandating certain actions (e.g., adopting a statewide textbook), inserting certain control mechanisms (e.g., instituting a statewide testing program), or of intruding certain economic or political factors (e.g., arranging the purchase of language laboratory equipment or causing board dismissal of an uncooperative teacher).

The reconstructed logic of the diffusion process is thus as follows: The diffuser has the task of building awareness and understanding of an invention and causing practitioners to consider its features with a view to possible application. To discharge this function he has essentially six techniques at his disposal: telling, showing, helping, involving, training, and intervening. He will use any combination of these techniques to cause favorable consideration without resorting to hucksterism or unethical manipulation. He sees himself as a person opening viable professional alternatives to the potential adopter with a problem to solve.

Adoption

The purpose of adoption activity is to shape and install a problem solution or invention within a particular local setting. This phase seems to have received little conceptual attention from anyone; it is perhaps the most muddy of the four. It seems to me that at least three major steps are involved, with the second of these being divided into several sub-steps (FIGURE 5) as follows:

Figure 5



1. *Trial.* No prudent administrator will permit the installation of a proposed problem solution on a permanent basis without having convinced himself that it will perform as claimed. Indeed, a local trial is mandatory

even when national assessments have indicated that the solution performs well on the average, for the obvious reason that the situation in which installation is proposed may not be average. Local variations must be taken into account.

2. *Instcllation.* When a proposed solution has proved itself through a local trial, it then becomes necessary to arrange for its installation on a building-wide or system-wide basis. At least four areas of concern must be attended to:

Modification. No invention will fit exactly into a local school situation for which it was not explicitly designed. Decisions will have to be made whether the fit can best be accomplished by modifications in the invention itself or in the school situation. If for example the invention requires teachers with particular skills but teachers with these skills are simply not available, some modification in the invention will be required.

Training. Personnel expected to use the invention must be trained. No teacher will willingly risk his reputation before a class with a technique about which he is unsure. More importantly, no administrator should be willing to permit a teacher to adopt a new technique without proper training for use, lest through lack of knowledge he should fail to take full advantage of whatever additional benefits are expected to accrue.

Facilities. Many inventions require particular kinds of physical arrangements. Typically a school adopting such an invention will not be suitably housed for the purpose or may not possess appropriate equipment. Flexible scheduling or multiple-size grouping cannot occur in a building arranged for conventional size classes of 25 or 30.

Administration and organization. The proposed invention may have important administrative or organizational consequences. Problems in scheduling, in budgeting, in staffing, in organizing may all produce headaches for the administrator. Unless these possibly disruptive consequences can be foreseen and obviated, the result may be a failure of an otherwise useful invention.

3. *Institutionalization.* Ultimately the invention must be assimilated into the ongoing program. At some time it must cease to be viewed as new and must become an integral and accepted component. It is not clear to me what steps might be taken to insure institutionalization. Sometimes I feel that the most important factor may simply be the passage of time. Obviously, the lack of awkward incidents in relation to the invention is

helpful and the more quickly the spotlight can be taken off of it the more quickly it is likely to become accepted.

How Are We Doing on Bridging the Gap Between Research and Practice?

In my preceding remarks I have attempted to illustrate the fact that there is a large gap between knowledge production and utilization, and I have attempted to depict the flow of knowledge from initial research into final use in terms of a four-category continuum. Our concern at this conference is primarily with the middle two categories, development and diffusion, for they represent the projected means for bridging this gap. I would like now to turn briefly to a consideration of what we are doing, and how well, in operationalizing these two categories.

I will, therefore, not make any further remarks about either research or adoption. I do feel compelled to observe, however, as we leave these categories behind, that my lack of attention to them does not indicate any high degree of satisfaction on my part with the way research and adoption activities are operating. Indeed, it is well known that research results are not being utilized to any great degree in educational practice, and that almost no attention has been paid either conceptually or practically to the problems of adoption which I briefly outlined above. But my concern today is with the bridge and not with the abutments, although I hope that due attention will be paid lest we mount our bridge of steel on banks of sand, when the time comes.

Let me turn then to a more detailed consideration of development and adoption.

Development

Development is a very complicated process which neither practitioners nor researchers are particularly competent to carry out. If there is any area in education that calls for reorganization and for the evolution of new professional roles, this is certainly it. Experience from industry indicates that from five to eleven times as much investment is required to develop an application from a research finding than was necessary to produce the research finding in the first place. High level specialists are required to do the job. Moreover, development depends not only upon the availability of relevant basic research but upon a host of other factors as well: the availability of resources, institutional support, experience, practical judgment, political factors, and the like. Research data provide only *one* of several critical inputs, and the blending of these inputs re-

quires more specialized skill than either researchers or practitioners commonly possess.

Initial attempts at development in education occurred gradually and without a clear realization of what was happening. I am sure that the persons following the lead of Jerrold Zacharias in the development of the PSSC physics materials were scarcely aware of what a vanguard group they were. The several other curriculum development groups, mainly funded by the National Science Foundation in those early days, were certainly more interested in updating content than they were in establishing development patterns which others might emulate. But their pattern did seem to prove successful, and it was soon emulated, particularly in the new course content improvement projects of the U.S. Office of Education.

In more recent years we have seen further systematic attempts to establish development agencies. Clearly the research and development centers have a mandate to turn their research into practice. But as we have seen, successful development involves a great deal more than the mere availability of relevant research. We may well wonder therefore whether the primarily research-oriented R & D centers will be up to the task. Another similar effort has occurred in the establishment of the regional educational laboratories, which are mandated to identify and solve educational problems, hopefully through recourse to research but by other means if necessary. Thus far the laboratories are too new to make it profitable to venture a judgment about their probable level of success.

It seems that no existing agencies have responsibility for the full range of development activities indicated by the taxonomy presented earlier. The depicting function seems to be especially neglected. While both regional laboratories and Title III projects were mandated to make needs surveys of their regions, it is clear that these surveys were carried out in a most perfunctory way, and without the benefit of hard data in many cases. (I should note at once that this is not the fault of the agencies involved so much as it is of the Office of Education, which mandated these surveys under incredible constraints of time and resources.) More importantly, even when well done, these surveys provide but a static "snapshot" of the situation at any moment rather than a dynamic "motion picture film" over an appreciable time span.

The invention function is perhaps better managed than the others, although certainly not nearly as well as it should be. Funds are available for improvement projects and several agencies, including the new industry-education combines as well as the regional laboratories and research and development centers, are beginning to undertake massive improvement projects. Yet a conceptual underpinning for such activity is still

missing. We still know far too little about effective ways of creating new solutions or even of transmitting, translating, or transforming known solutions.

Fabrication will probably be handled best by the industry-education combines, since these typically involve publishers and manufacturers of hardware that can be used to good effect. The publishing industry has shown a great deal of ingenuity in the past in placing its materials into interesting and novel formats and will probably continue to do so.

In the area of testing we come again upon a quite underdeveloped area. We shall see later that existing evaluation designs do not seem to be too appropriate for the real problems of education. We may also be concerned that if much of the fabrication is carried on by commercial agencies, they may be over eager to rush their fabrications into production without the kinds of testing that would assure a professionally warrantable product. Thus both conceptual and consumer protection innovations are needed in the area of testing.

From one point of view, then, the development picture is not too rosy. When one considers, however, how late in the day we determined to undertake development at all, and with what meagre resources we have supported it, we may perhaps be forgiven if we take a more charitable view. Now that education is fully aware of the need for development activities, is apprised of their complexity, and is being aided with resources to get development activity started, we may hope that within a decade most of the problems I have enumerated will have disappeared.

Diffusion

Diffusion is an activity regarded with some distaste by many members of the educational establishment, particularly the research community. It is often equated with hucksterism, and I suppose, in fairness, that one must concede that a great deal of hucksterism does take place. This fact may be the best argument one can muster in favor of well organized diffusion efforts, however, so that one can be sure that what is being diffused is a viable alternative rather than just another fad.

Traditionally educational diffusion has fallen within the domain of commercial interests, mainly the book publisher. Recently both research and development centers and regional educational laboratories were given some diffusion responsibilities, and these agencies have begun to develop new approaches, although haltingly.

The major diffusion responsibility seems to be falling squarely on the shoulders of Title III projects. There is a school of thought that suggests

that research and development centers should be concerned with research, regional educational laboratories with development, and Title III projects with diffusion. This is a formulation with which I am in essential agreement, perhaps because this division of labor would fit my earlier model so well. There would be at least three of the change stages, then, for which institutional responsiblility would be firmly fixed. This formulation also seems to be supported in the Office of Education.

But whatever our view may be about the appropriate institutional arrangements for carrying out the diffusion function, it is clear that that function has not to date been carried out very well. In my own opinion the major reason for this failure may be traced to our earlier failure to delineate acceptable *strategies* for diffusion. I use the word *strategy* to indicate an action plan which indicates which of the adoption techniques outlined in the earlier adoption activity taxonomy should be used when and where and in what combination. To evolve such a strategy seems to me to imply some consideration of at least the following elements:

1. *Assumptions concerning the nature of the practitioner who will be exposed to the strategy.* The practitioner may be viewed as a rational entity, who can be convinced, on the basis of hard data and logical argument, of the utility of proposed invention; as an untrained entity who does not know how to perform but who can be taught; as a psychological entity who can be persuaded; as an economic entity who can be compensated or deprived; as a political entity who can be influenced; as an entity in a bureaucratic system who can be compelled; or as a professionally oriented entity who can be obligated. We might term these respectively as *rational*, *didactic*, *psychological*, *economic*, *political*, *authority*, and *value* assumptions. Obviously the ways in which the earlier outlined techniques are used will depend heavily on which assumptions one makes. Therefore, telling, showing, training, etc. will certainly be different if one assumes a rationally oriented subject, i.e., one who will be convinced by facts, than if one assumes a politically oriented subject, i.e., one who can be manipulated.

2. *Assumptions concerning the end state in which one wishes to leave the practitioner.* Very little attention is typically paid to the question of the end state in which the diffuser wishes to leave his subject. This situation may arise, of course, because the diffuser may act as a mere huckster; hucksterism may "sell" a particular invention being promoted but it may leave the practitioner with very little residual propensity ever to consider any other proposed invention. But even with "well-intentioned" diffusers this difficulty may arise because of a basic failure to consider desirable

end states. What is it that the practitioner should be able to do, think, or to feel as a result of having been exposed to a diffusion strategy? Is he to be better trained? More skillful? More knowledgeable? More open? Wiser? Obviously the choice of a diffusion strategy would be considerably aided by careful attention to this factor. It seems particularly ironic that this situation of carelessness about end states should hold true in the field of education, which is so generally characterized by concern about behavioral outcomes and objectives. If we applied a little of our usual logic about specifying expected goals this difficulty would be largely overcome.

3. *Assumptions about the nature of the agency or mechanism carrying out the diffusion activity.* No sensible diffusion strategy can be evolved without careful attention to the matter of who is to carry it out. For not all strategies are within the capabilities of all agents or mechanisms. Constraints exist which mandate certain actions for certain agents and which prohibit other actions to them. So for example, a regional educational laboratory, acting as a diffusion agent, is hardly in a position to intervene, since it lacks the necessary power or authority to do so, but telling, showing, or involving come "naturally" to it. A state department of education may well intervene (and indeed may be legally mandated to do so) but would probably be very suspect if it tried to involve. An individual teacher can tell and show but probably would be thought ridiculous if she set up a training experience for her fellows. A university, however, could carry out this latter function with impunity. Since the final implementation of the strategy depends upon the agent, the strategy must be one appropriate to the agent's circumstances.

4. *Assumptions concerning the substance of the invention.* Obviously not all inventions are alike; they pose different problems of adoption, and this fact must be taken into account in developing an appropriate diffusion strategy. One way to view this situation is in terms of the amount of change mandated by the invention. Thus Chin (1963) characterizes innovations as involving *substitution, alteration* (a minor change), *perturbations and variations* (mere changes in organizational equilibrium), *restructuring* (requiring reorganization), and *value orientation change* (deep-seated value changes). Rogers (1962) talks about characteristics of inventions that make them more or less acceptable, including *relative advantage* (intrinsic superiority), *compatibility* (consistency with existing values and experience), *complexity* (difficulty in use), *divisibility* (degree to which the invention can be partitioned and/or tried on a limited basis), and *communicability* (or diffusability). Whether these

or other ways of classifying the substance of innovations are most useful is less important for us at the moment than that there be some explicit way for taking account of substance at the time that a diffusion strategy is devised.

We are thus confronted, in considering diffusion, with a picture that is, if anything, even less satisfying than that presented by development, which we reviewed earlier. There seems to be a considerable confusion about the organizational responsibilities that may exist in this important arena, with attempts to develop viable organizations being so recent as to invalidate any attempts at judgment at this time. Further, theory and practice are both relatively silent on the important issue of how diffusion strategies are best devised. All we seem to be able to do at this time is to point to the important factors that probably ought to be considered. However, as in the case for development, when one considers how recently this concern has emerged and how new are our efforts to deal with it, we may perhaps be willing to take a more long range view.

Evaluation

Thus far I have said very little about evaluation, which you may have considered rather remarkable in view of the fact that the term appears in the title of this paper. I wish to remedy that defect now. Evaluation is so important and so pervasive a concept when we think about closing the gap between knowledge production and utilization that it deserves quite detailed and separate attention.

I shall have two major points to make about it: (1) The concept of evaluation is changing rapidly, becoming in particular much more pervasive than has traditionally been the case, and (2) The methodologies currently in use for evaluation are hopelessly bad and urgently need replacement.

Let me begin with some observations about what has in the past been meant by evaluation. Typically two complementary operations are denoted by the term: (1) the comparison of some results, output, or product with a set of standards, in an absolute sense; and (2) the comparison of some two or more methods of producing the same results, output, or product, in a relative sense. In the first case the standards were usually derived in relation to some objective. Thus, the objective might be to develop reading skill, and the standard might be the 4.0 grade equivalent on the Stanford Reading Achievement Test. Pupils could then be judged, in an absolute sense, on their achievement of that objective. Or two methods of teaching reading skills might be judged to determine which

produced a higher average reading skill level in two groups of pupils, in a relative sense.

Measurements taken to carry out these classic forms of evaluation are usually of the pre- and post-test type, depending upon one's preoccupation with initial status, group equivalence, and similar matters relating to control or data analysis. The term *bench mark* is frequently used to describe collection of initial status data. Between collection of bench mark data and final performance data a long period, say a semester or school year in length, could and usually did intervene, during which data might or might not be collected but during which stringent controls are maintained so that the data will not be confounded. In particular great care is taken not to alter any essential element related to the method, technique, or content being evaluated, lest the change render the evaluation invalid (one could not tell what was being evaluated). Generally speaking the traditional rules of experimental design and field control are rigorously invoked. The essential task of traditional evaluation is to judge.

Emergent evaluation however is seen as a tool to aid in decision-making. The tasks of (1) identifying an educational problem or need, (2) devising or selecting a treatment to cope with it, (3) implementing the treatment procedures, and (4) determining the treatment's feasibility, quality, effectiveness, and efficiency require a series of decisions which evaluation can aid. The process of collecting and interpreting data relevant to this series is seen as the substance of evaluation.

Daniel Stufflebeam (1967) of the Evaluation Center at The Ohio State University seems to me to have come closest to defining the new evaluation when he talks about four kinds of evaluative activity. The first of these is *context evaluation*, which, in the setting of the school, means the continuous determination of the school's status on key variables with a view to identifying needs and problems. Such an evaluation gives the decision-maker data he needs to have about important directions in which he should move. Second, there is *input evaluation*, which is concerned with assessing various possible responses to the needs or problems that may exist. There are probably a number of ways, for example, in which a school principal might revamp his reading program to take account of the special problems posed by culturally disadvantaged children; which of these ways has the highest payoff potential in his situation? Third, we need to be concerned with *process evaluation*, which is used to determine whether the selected input is working as it was expected to and which, even more importantly, provides for continuous feedback so that the selected input can be continuously refined and adjusted to better achieve its intended purpose. Finally, there is *product evaluation*, which is most

like what we have traditionally meant by evaluation, i.e., the determination of the feasibility, quality, efficiency, and effectiveness of the input in responding to the need or problem involved.

It is interesting to check the terms of this analysis against the terms listed in the taxonomy of development presented earlier. What Stufflebeam calls *context evaluation* is of course very similar to what I meant by the term *depict*, i.e., a continuous assessment of the situation. We might note the similarity of this concept of continuous assessment to the older concepts of bench mark or base line, but while these latter are static concepts indicating status at some point in time like a snapshot, the continuous assessment idea is rather like a dynamic bench mark or base line, giving, as it were, a continuous motion picture film of what is going on. Needless to say attempts at continuous assessment pose some interesting methodological problems.

Next, it seems clear that Stufflebeam's idea of *input evaluation* has relevance at what I have called the "invent" stage of development. In order to determine, for example, whether the invention problem is one of transmitting, translating, or transforming existing solutions, of synthesizing new solutions from available elements, or of creating a solution *de novo*, some assessment will be required of possible inputs and their probability of useful payoff.

Finally, when a solution has been fabricated, it must be tested, and it is clear now that testing should involve both *process* and *product* measures. It is likely that the solution will not be in near-perfect form when it is first applied in a real context; hence continuous improvement is mandated. Process evaluation allows for this contingency Further, we need to be sure that the solution is being applied in a form reasonably similar to the one its fabricators had in mind; again, process evaluation to the rescue. And of course we want to be sure that the solution does in fact achieve its objectives; i.e., meeting the need or responding to the problem. And here we have product evaluation.

Needless to say, we are a long way indeed from having the techniques necessary for applying evaluation in the way indicated by this analysis. These concepts are only now emerging, and it will take a long time before we are able to apply them systematically in operational situations. But it is clear that traditional concepts are no longer good enough.

The shortcomings of traditional evaluation can be documented in other ways than through such a theoretical analysis, however. We need only to look at the large mass of "no significant difference" findings typically produced by evaluation studies to begin to wonder about the power of the techniques, particularly when all the evidence of the senses of participants

argues that there is a difference. Or consider the conclusion of the widely-publicized Coleman report (1966, p. 235), which asserts, after a most careful and thorough examination of all available data, that there is only a ". . . relatively small amount of school-to-school variation that is not accounted for by differences in family background, indicating the small independent effect of variations in school facilities, curriculum, and staff upon achievements."

This conclusion is simply incredible on its face. It means, if true, that it makes no difference whether a teacher is good or bad, whether good or poor materials are available, whether the school is a barn or a geodesic dome, students will learn about the same (and not much at that!). Now anyone who has spent any time at all in a school knows that is just not so; why then do our evaluative techniques not pick this up?

I believe it can be argued that traditional evaluation has four characteristics which account for its sharply limited utility. These include *terminal availability of data, retrospective view, imposition of constraints,* and *limited generalizability.*

1. Evaluative data are usually available only upon the termination of the evaluative period. Hence they can provide information relevant only to "go," "no-go," or "recycle" decisions about the treatment being evaluated. Other kinds of decisions cannot be served.

2. Evaluative data typically afford only a retrospective view. The evaluation does not provide information during the test of the treatment which might have been used to improve it.

3. The assumptions on which evaluative designs are based (those of traditional experimental design) impose a series of constraints on the evaluator. There can be, for example, no variation in treatment or context once the evaluation is under way, since this would result in the confounding of critical variances. Thus traditional evaluations militate against any concurrent effort at improvement of the treatment and against other contextual changes, e.g., the introduction of any other innovation, during the term of evaluation.

4. The constraints imposed because of the requirements of classical experimental design in effect create a laboratory condition within which the treatment will be tested. The many sources of variation found in the real world are deliberately excluded from having any effect upon the outcome. The evaluation describes what happens under laboratory circumstances, and not under "typical" circumstances. The generalizability of the findings is thus necessarily limited.

The problem of constraints is an especially interesting one and prob-

ably deserves some special comment. Generally speaking, the constraints arise because of a variety of assumptions that must be made to support the logical and statistical structure of design theory. Three general classes of assumptions may be identified:

1. *Statistical assumptions.* Statistical assumptions support the development of the statistical techniques for analyzing and interpreting data. There are certain assumptions necessary to know that a distribution is normal before one can assert that 68 per cent of the cases are included in the interval $\overline{X} \pm s$. Other assumptions are built into the derivation of the interpretive tables in which the "significance" of analytic statistics is read; thus the derivation of the F distribution depends upon assumptions of random sampling from a population in which the variable of concern is normally distributed. Finally, still other assumptions are necessary to support the logic of an analytic method. Thus, in the case of analysis of variance (and other tests of significance), the additivity assumption which asserts that treatments have equal effects on all persons to whom they are applied, is vital. For unless this assumption is met, group variances change and the basis for computing an error term disappears.

2. *Design assumptions.* A second class of assumptions has to do with the logical requirements of design procedures. Typically, in an experiment, the effect of some treatment is to be determined. A group exposed to the treatment cannot simply be measured to determine that effect, for the obvious reason that there exists no "bench mark" against which to assess that measurement. If the bench mark is provided by simply making a second (earlier) measure on the experimental group, the difference may still be called into question as having been caused by other extraneous (confounding) effects such as history, maturation, and the like. A second group, the control group, is usually added to obviate this difficulty. But the second group is useless unless it is comparable to the first, because design procedures have been worked out on the assumption that such comparability exists. The function of the assumption of comparability is to protect the internal validity of the experiment.

But external validity (generalizability) may be threatened also. First, we need to be certain that experimental and control groups were in fact selected in some way which guarantees their representativeness of the population to which the results are to be generalized. Under ideal circumstances such representativeness can be guaranteed only by both random selection of subjects from the population and random assignment of the subjects to the experimental and control groups (random selection and

assignment would of course also guarantee comparability). Then, we must protect the groups against reactive or interactive effects that would alter the groups in some way during the experiment so that their representativeness would be dubious.

Thus, design theory as it is now explicated requires *comparability* to protect internal validity, and *random selection*, *random assignment*, and *reaction-interaction control* to protect external validity.

3. *Treatment assumptions.* Statistical and design assumptions are quite well understood because these assumptions had to be made explicitly in order that the statistic or the design could in fact evolve. Less well understood are the implicit assumptions made about the treatment whose effect is to be tested. It must be assumed that the treatment is fully explicated *a priori*. It must be assumed that the treatment can be "plugged into" an experimental setting with no interactive effect with other elements. The treatment must further be invariant throughout (else the variances are confounded) and must be applied in identical ways by all persons responsible for its trial. Finally, it must be the case that there are no competing treatments, for if such competing treatments exist their individual effects cannot be separated.

All of these assumptions are in some particulars unrealistic for education. Among statistical assumptions, for example, the additivity assumption is especially inappropriate; every experienced teacher knows that effective teaching will increase the variance of the group being taught, and usually markedly. Among the design assumptions the comparability problem is especially sticky. Usually comparability cannot be managed directly. So an indirect process, such as locating schools with similar buildings, similar socio-economic backgrounds, similar intelligence levels, etc., is used. Such procedures may or may not solve the comparability issue, but they certainly do destroy external validity, at least to the extent of limiting the generalizability of the findings to similar restricted groups. Finally, among the treatment assumptions, treatment invariance is not only quite difficult to achieve, but may be undesirable, since the treatment may be one that could profit from continuous improvement even while being tested.

This analysis has led me to the conclusion that some new evaluation strategy free of the defects that I have enumerated is necessary before evaluation as a science can make its next major strides. Of course no such strategy exists at the moment, but it is possible to indicate certain characteristics which it must have if it is to be successful:

1. *Level of control.* Typical experimental controls must be eliminated.

The evaluator must be concerned with how things occur in the field rather than in the laboratory. Hence the kind of control that we have been accustomed to in laboratory experimentation will be sharply different, perhaps non-existent.

2. *Non-intervention.* The evaluator cannot arrange the inquiry situation but must accept it as it occurs. Data collection must be carried on in a non-intervention mode, i.e., without disturbing either the context or the subjects.

3. *Continuity of data collection.* Data are not collected simply at pre- and post-experimental periods (or at some particular check points) but continuously throughout the evaluation. The baseline of data must be dynamic rather than static.

4. *Treatments.* Treatments cannot be regarded as invariant but as susceptible to continuous change (improvement). Context conditions must also be alterable.

5. *Scope.* Attention must be given not only to particular variables which have been identified and operationalized beforehand, but to any emergent variables which appear to be of concern.

6. *Assumptions.* The evaluation system cannot be cause to conform to traditional assumptions, but rather the assumptions must be formed to meet the reality of the situation. It is only on such reality-oriented assumptions that a useful theory of evaluation can be based.

Conclusion

Well, as you can see, I haven't learned much over the last decade; I am still playing the old nomothetic-idiographic game in a new guise. However sparkling my ideas may be, they certainly do not provide very much operational guidance. But that is exactly the problem I have tried to deal with, and this presentation is as good an example as any of the fact that there is an enormous hiatus between theory and practice.

Whether you agree with my particular formulations or not interests me less than that you agree that there is a problem of fantastic proportions confronting us. It is a problem that will not be solved without a great deal of attention to emergent roles and organizations. We have made some strides on the problem of organizations, as witness the new agencies and programs that have emerged as a result of the passage of ESEA. On the personnel problem we are still far behind; so far as I know there is no program in existence anywhere making a concerted effort to train the range of middlemen that will be required. Indeed, we are still lacking

even a primitive formulation of the roles that should be created. We certainly do not know where we shall recruit the persons who will ultimately fill those roles. We have no materials with which to train them.

Where shall we turn for responsible leadership? It seems to me that leadership must, at this moment, come from the two existing establishments that are necessarily most concerned about the gap—the *educational researchers*, who stand at one end of the knowledge production-utilization continuum, and the *educational administrators*, who stand at the other end and who bear the responsibility for effective practice. Neither group, I am convinced, can do this job alone, and neither group ought to attempt to do it alone. But both groups must cooperate to get things started.

I don't know how the initial step should be taken. Perhaps a national commission of researchers and administrators should be appointed, with or without the blessing of the U.S. Office of Education. Perhaps AASA and AERA should combine in this venture. Perhaps university faculties in these two areas should develop joint programs for the training of middlemen. Perhaps UCEA can serve as an appropriate forum. Whatever the route, the action must come soon, for the need is great.

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CHAPTER
4

Ronald G. Havelock

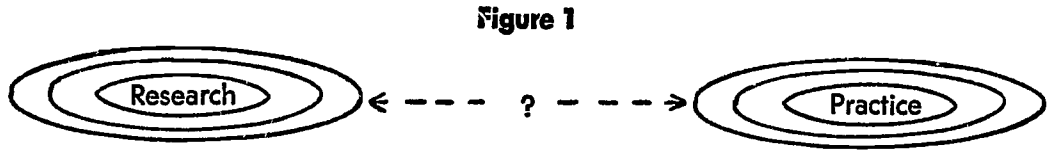
Dissemination and Translation Roles

Introduction

Any detailed consideration of the dissemination and utilization of knowledge must sooner or later focus on the question of linking roles. Who sees to it that knowledge gets to the user? Who is charged with the responsibility of retrieving basic or applied knowledge, deriving practical implications from it, and distributing it to people who need it and can use it?

A natural starting point for a discussion of linking roles is a birds-eye view of what is often termed "the knowledge gap": the situation for which linkage is required. FIGURE 1 depicts this gap: the two enclosures represent two social systems each defined and identified by its own set of rules, values, languages, and communication patterns. Those norms which are shared within each system also define their separateness from each other. There is an inadequacy of shared values, common perceptions, and inter-system communication patterns.

Figure 1



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The linking role argument is that this gap can be bridged effectively if additional persons or groups are interposed between the two systems as in FIGURE 2, these additional intermediaries being specialists in the process of linking itself.

Figure 2

The basic question is whether linking roles are really necessary or whether it is preferable for knowledge builders to pass their findings directly to potential users, bypassing a middleman who would translate (and possibly distort) the researcher's knowledge. There is no easy answer to this question, but in the presentation which follows we will try to address ourselves to it. We will try to show what all the components of the linking function are, and with that understanding we will return to ask again whether linking roles are necessary.

This paper will begin with a review of the various roles which seem to serve the primary function of knowledge linking. Following this review, these same roles will be cast in their institutional context with consideration given to the institutional barriers to knowledge flow both on the knowledge builder and knowledge user sides and to the institutional arrangements which facilitate the linker's activities. The presentation will conclude with a summary analysis of what appear to be the endemic problems in the linker concept and some thoughts about how it ought to be developed in education. We will endeavor to be practical, indicating what types of linking roles seem to be most suitable and effective for what linking tasks, what characteristics and skills need to be considered in recruiting and training linkers, and what kind of institutions need to be created to secure these roles and to make knowledge linkage an embedded feature of our national educational system.

A Typology of Linking Roles

One of the first facts of which we should be aware when we discuss linking roles is that there are a great variety of roles which could be said to be linking in one way or another. Indeed, connected to every phase, every aspect, and every problem in the dissemination and utilization process, one could conceptualize a specific role—someone responsible for retrieving knowledge from basic research, someone responsible for identifying new innovations in practice, someone responsible for writing handbooks

and producing packaged knowledge for potential clients of various sorts, and so forth. The range of such roles is suggested by some recent attempts to classify them. A well-known typology current in education is that developed by Clark, Guba, and Hopkins in a number of recent articles, e.g., Clark and Hopkins (1966). They have posited a sequence of interrelated roles which correspond to various stages in a research, development, and diffusion sequence. Under "development" they include roles for "inventing," "packaging," and "evaluating," while under "diffusion" they list "informing," "demonstrating," "training," and "servicing" or "nurturing." Another educator (Hencley, 1967) offers a "taxonomy" of research and development roles which includes "quality controllers," "social bookkeepers," "design engineers" and "researchers who concentrate on diffusion." One could go on to other theorists and taxonomists in education and other fields to find similar lists. Each list has its own special logic and its own special elegance. It is, therefore, with considerable trepidation that we set out to compile our own typology, piecing together from diverse sources those concepts pertaining to linking roles which seem to be non-redundant and conceptually additive or integrative.

A cautionary note may be in order before we proceed, however. As in any classification, the "types" offered here are all somewhat fictional, something on the order of "ideal types." When we look at the linker *in vivo* we find that he is a mixture, playing several linking roles in sequence and simultaneously and indeed sometimes not playing the linker at all.

Here, then, in TABLE 1, is a typology of linking agents drawn from a wide spectrum of sources across many fields of knowledge, and grouped under major headings which suggest their most salient functions or the assumptions about the transfer process which each set seems to imply.

The conveyor

The most rudimentary and simplistic linker concept is the "conveyor" (Havelock, 1967) or "carrier" (Jung, 1967), one who takes knowledge from expert sources and passes it on to non-expert potential users. The "knowledge," of course, could be in the form of research data, information derived from research, "packaged" knowledge derived generally from scientific knowledge in the form of curricula, printed materials, and training programs, or it could be supplies, products, services, or practices founded on or derived from scientific knowledge in one way or another. The pure conveyor concept suggests that such knowledge is passed on pretty much in the form that it is received. It seems doubtful, however,

Table 1
KNOWLEDGE LINKING ROLES

ROLE TYPE	FUNCTION	FIELD	EXAMPLES	SAMPLE REFERENCES
Conveyor	To transfer knowledge from producers (scientists, experts, scholars, developers, researchers, manufacturers) to users (receivers, clients, consumers)	Agriculture	County agent (especially as seen by others)	Wilkening (1958) Abraham (1962)
		Agriculture	Extension Specialist	Brown and Deekens (1958)
		Agriculture Medicine	Salesman, retailer, drug detail man.	Elliott and Couch (1965) Anderson (1955) Bauer and Wortzel (1966)
		Psychology	Science reporters	Wood (1962)
		Education	Trainers Informers Demonstrators } Dissemi-nators	Clark and Hopkins (1966)
		Education	Teacher	
		Gov. Policy	Scientific expert	Moulin (1962) Schilling (1962) Sponsler (1962) Geiserson (1965)
		Industrial R & D	Systems engineer	Havelock and Benne (1967)
Consultant	To assist users in identification of problems and resources, to assist in linkage to appropriate resources; to assist in adaptation to use: facilitator, objective observer, process analyst.	Various	Mental health consultant	Bowman (1959) Binslerman (1959) Berlin (1964) Kaufman (1956) Glaser (1967)
		Various	Change agent	Lippitt et al. (1958)
		Organization	Change agent	Schien and Bennis (1965)
		Education	Change agent	Watson (1967A) (1967B)
		Agriculture	County agent (as he actually operates much of the time)	Stone (1952) Penders (1963)
		Urban	Expeditor	Reiff and Reissman (1964)
		Psychiatry	Legal mediator	Tershakovec (1967)
Trainer	To transfer by instilling in the user an understanding of an entire area of knowledge or practice.	All Fields	Teacher Professor of Practice	
		Education	Trainer	Clark and Hopkins (1966)

Leader	To effect linkage through power or influence in one's own group, to transfer by example or direction.	Education	Administrator: superintendent, principal	Carlson (1954) Richland (1965) Chesler et al. (1963)
		Various	Gatekeeper	Lewin (1963)
		Medicine	Opinion leader: physician	Katz (1957)
		Agriculture	Opinion leader: "good farmer"	Blackmore et al. (1955) Wilkening and Santopolo (1952)
		Community (urban)	Opinion leader: informal power structure	Angell (1951)
Innovator	To transfer by initiating diffusion in the user system.	Agriculture	Innovator	Rogers (1962)
		Agriculture	Demonstrator: farmer	Blackmore et al. (1955) Wilkening and Santopolo (1952)
		Industry	Product champion	Wilkening (1958) Nader (1967)
		Industry	Entrepreneur	Wilkening (1958) Nader (1967)
Defender	To sensitize the user to the pitfalls of innovations, to mobilize public opinion, public selectivity, and public demand for adequate applications of scientific knowledge.	Various	Defender	Klien (1967)
		Agriculture	County agent	Francis and Rogers (1960)
		Education	"Quality controller"	Hencley (1967)
Knowledge-builders as linkers	To transfer through gatekeeping for the knowledge storehouse and through defining the goals of knowledge utilization.	Various	Scholar: scientific leader	Znaniecki (1940)
			General educator	
			Definers of human values	
		Various	Futurists and future planners	Wright (1965)
	To transfer through maintenance of a dual orientation: scientific soundness and usefulness.	Industry	Applied researcher-developer	Stein (1966)
		Education	Applied researcher-developer	Clark and Hopkins (1966)
		Medicine	Clinical researcher	Havelock (1964)
		Industry	R & D Manager	Pelz and Andrews (1966) Krugman and Edgerton (1959)

		Education	Res. coordinator	Sieber (1966)
		Education	Res. director	Sieber (1966)
		Education	Engineer	Anderson (1961)
		Education	Curriculum developer	Clark (1965)
Practitioner as linker	To transfer to clients and consumers through practices and services which incorporate the latest scientific knowledge.	All		
The User as linker	To link by taking initiative on one's own behalf to seek out scientific knowledge and derive useful learnings there from.	Agriculture	Most advanced farmers	Rogers (1962) Havelock and Benne (1967)

that anyone in a linking role performs in such a limited capacity. Perhaps the salesman comes as near to this pure linking role as anyone, taking from the producer a fully developed, fully packaged, and fully usable product and placing it in the hands of the user. There is very little question that salesmen *in all fields* play important knowledge linking functions (Abell, et al., 1957; Bauer and Wortzel, 1966; Elliott and Couch, 1965; Stein, 1966; Wilkening, 1956). Even the salesman, however, may be helping the user in a more complex manner than is usually conceived. The drug detail man may give the doctor samples and literature of various sorts and he may, in addition, tell him what drugs Dr. X in the next town is ordering (Bauer and Wortzel, 1966). The grain elevator operator (Elliott and Couch, 1965) may pick up items from agriculture experiment station bulletins so he can pass on useful bits to farmers and thereby develop firmer ties of friendship and respect.

Another role which may come close to the pure conveyor type is the extension subject matter specialist in agriculture. A full time agent of the Agriculture Extension Service (AES), he is based in the university and is responsible for keeping the county agents informed and up-to-date on new developments in his special area. There is some research evidence that these extension specialists do indeed see their role primarily as that of one-way communicators of university research to the counties (Brown and Deekens, 1958). Nevertheless, the linking task of this specialist is a sophisticated one. He must take research findings in raw form and package them into pamphlets, programs, projects, lectures, training courses

and other forms which are readily digestible by the county agent and his farmer clients. Such a variety of tasks would in industry involve such varied roles as research retrieval, engineering, production, packaging, advertising, and marketing.

A similar linking role is played by the science reporter, who retrieves and interprets knowledge from a wide range of scientific sources, even if he specializes in one field, and draws forth items which appear to be of interest to the general public (Wood, 1962).

Of all conveyor types, the one most frequently cited and viewed as a classic is the county agent of the AES, who is most frequently viewed as a one-way communicator of new technical information from the state university to the farmer. Various studies of the "image" of the county agent indicate the prevalence of this limited conception (Abraham, 1963; Wilkening, 1958). This view is not shared by the county agent, himself, however, and is not confirmed by researchers who have studied the role in depth (e.g., Stone, 1952; Wilkening, 1956). In fact, the county agent serves as communicator, teacher, consultant, demonstrator, helper, and community leader, culling information from a variety of sources and disseminating it in a variety of ways.

When planners and policy makers in education discuss the need for more disseminator and diffusor roles in education (e.g., Clark and Hopkins, 1966) they should be sensitive to this distinction between "conveyor" and a more complex conception of linker. There is, nevertheless, a distinct logic to the simple concept and a distinct utility if it could be made to work in practice. The trouble with the concept may be in large part one of "image." The fact is that terms like "disseminator" or "conveyor" sound to most people like "errand boy," and "runner." Znaniecki, for example, discussing the disseminator function, says: "... while important socially (to develop support for scholars), it is scientifically unproductive" (Znaniecki, 1940, page 150). Halpin puts the matter bluntly:

> I can only writhe as I watch the fatuous and condescending attitude of both the scientist and educational practitioner toward prospective middlemen. Even the advocates of the middleman plan imply that the middleman should serve as a type of editorial assistant, at a status level only slightly above that of the average secretary and certainly below that of the research technician. (Halpin, 1962, p. 198)

Such comments may well be valid in the main. There are some conveyor-type linkers, however, who escape stigma altogether. In particular we can cite the by now well-established role of scientific expert or advisor. Perhaps beginning with the mobilization of brainpower in the Second World War, there has been increasing interest at the highest levels of

government for advice and presumably expert information from distinguished scientists. In repeatedly answering this call, some of our most renowned scientists have, in effect, turned themselves into knowledge linkers of the conveyor type. Unfortunately, there have been no quantitative and thorough empirical studies of this role of scientific expert, although much has been written in a journalistic vein. Most writers focus on the question of the legitimate or proper role of the scientist in the policy-making and decision-making process. Many warn of the dangers of too much reliance on experts. For example, Moulin (1962) notes that experts are replacing public opinion as guiding forces in political decisions (hence possibly subverting democracy). Schilling (1962) and Michael (1966) warn that scientists may disguise personal values and partisan viewpoints in the form of "expert advice," while Penders (1963) cautions us that expertise at the top, while indispensable, should only be used in conjunction with heavy local responsibility. On the other hand, some writers deplore the relative powerlessness of the scientist-expert. Sponsler (1962), for example, contrasts the influence of scientists in the Soviet Union and the United States: there they are "on top," in significant policy roles, but here only "on tap," and therefore functioning in a marginal and less-than-optimum capacity. On the other side of this argument, Leiserson (1965) says that as we move from "technical" to "policy" advice, the scientist's role becomes less vital and this is as it should be to protect and maintain his status as an objective knowledge source.

Another successful, if less exalted, linking role is found in some sectors of industrial R & D in the title of "systems engineer." As this role is depicted operating in the Bell Telephone Laboratories (Havelock and Benne, 1967; Morton, 1964), it allows basic researchers and development engineers to pursue their separate special interests without "interference" from management. The systems engineer looks over their shoulders, pulling out ideas and popping them in when it seems appropriate, but not disrupting their ongoing creative efforts. One might assume that such a person would be subjected to second class status as depicted by Halpin. In fact, however, he survives and prospers to the point where upper management looks to this group for future leadership positions.

To sum up, the conveyor concept of linkage is a very limited one but has wide-spread currency; it is what people usually think of when they think about special roles to disseminate knowledge. Very low valuation, by researchers and practitioners alike, suggests that it is a problem role under most circumstances. There are instances, however, where conveyor-type linkers are accorded high prestige and are able to operate with high effectiveness.

The consultant

In its purest form the consultant role is not necessarily a knowledge linking role at all. The consultant is, rather, a facilitator, helper, objective observer, and specialist in how to diagnose needs, how to identify resources, and how to retrieve from expert sources. He tells "how" in contrast to the conveyor, who tells "what" (Havelock, 1967; Jung, 1967). The underlying rationale for consultation is that only the client, himself (the user), can determine what is really useful for *him*. Therefore, when others come to his aid they should do so as collaborators, (Thelen, 1967) or encouragers (Bowman, 1959). It is up to the consultee to take the initiative (Boehm, 1956) and when information is given, he is in a position to take it or leave it. Binderman (1959) notes that five characteristics distinguish consultation from education: first, the *consultee initiates*; second, the relationship is *temporary* and *specific*; third, the consultant is from a *different professional discipline* than the consultee; fourth, he is *advisory* only, having no responsibility for implementation; and fifth, he has *no* administrative relationship to the consultee.

Consultation is often depicted as a second best procedure, a very passive, impotent, almost bystander role (Fry, 1964; Huessy, 1966), but two relatively recent developments have added considerable depth to the concept. One of these has been "mental health consultation,"[1] first advanced by Coleman and later refined by Gerald Caplan (Berlin, 1964). From the psychiatric interview came the insight that "help" really starts with "help me to understand myself" and "help me to define for myself why I need help and what help I need." This concept has been generalized from the mental health professions to all forms of helping and applies equally to knowledge linking. When someone comes to someone else for "advice," what they need first and foremost is an understanding of what their problem is and how they are reacting to it. The consultant, therefore, should allow the consultee to tell his story, not so the consultant may be informed, but so the consultee may be informed. This type of relationship calls for restraint and a non-directive stance by the consultant and a withholding of advice, expert information, and a minimum of programming for the consultee.

A somewhat different concept of consultation has been developed over the last twenty years by the staff of the National Training Laboratory under the label of "change agent" (Lippitt, et al., 1958). The "change agent" consultant, like the mental health consultant, emphasizes the need

[1] This should not be confused with psychotherapy, psychotherapeutic counseling or other varieties of treatment for mental illness, in spite of some similarities in historical origin and assumptions.

for client self-diagnosis and problem definition, but the change agent is flexible in what he gives. He may assist in the diagnosis by showing the client how to conduct a self-survey (Selltiz and Wormser, 1949), or by administering a self-survey to the client (Mann, 1950, 1962; Mann and Neff, 1961). He may help the client develop skills in problem formulation and problem solving and he may make the client aware of various change strategies. The change agent consultant is, therefore, an active participant and collaborator and a *conveyor* of knowledge about the process of change itself.

Both of these developments in consultation i.e., the mental health consultant and the change agent consultant, have come a long way in their twenty-year history, each developing as a distinct profession with its own rules and institutions. Most recently, however, there are signs of a merging of, or at least a mutual learning between, the two movements, the change agent group becoming more clinically sophisticated and the mental health consultation group more concerned with active helping and collaborating with the client (Chin and Benne, 1968).

While such refinements in the concept of consultation are now widely understood and accepted, the reader should be cautioned that the actual term "consultant" is still used very loosely to describe any type of advice-giver or expert, including the "conveyor" type discussed earlier (Fairweather, 1967). Many writers use the term to describe someone who is peripheral to the mainstream of decision-making, either because his expertise is not recognized or valued,[2] or because he needs to retain the onlooker's objectivity.[3] The term is used by Schein and Bennis (1965) merely to distinguish the outside change agent (the "consultant model") from various other change agent roles which *operate within* the client system.

We may be able to gain some perspective on the concepts of "conveyor" and "consultant," as used here, by a comparison of some of their attributes. TABLE 2 illustrates some important advantages of the consultant's role definition. However we do not wish to stress the value of the consultant over the conveyor as this table may imply. The emphasis should be placed on the unique contribution which each type of role may play in a total program of knowledge dissemination and utilization. The two roles may be used effectively in a coordinated development program, with the consultant type preparing the client or client system, building a readiness

[2] Early use of mathematicians in industry (Fry, 1964).

[3] Peter summarizes the viewpoint of social scientists about their action role: "observe and do research but remain essentially aloof from action programs" (Foundation for Research on Human Behavior, 1966, p. 374).

Table 2

FIVE DIFFICULTIES WITH THE LINKAGE ROLE: A COMPARISON OF TWO APPROACHES

PROBLEM	CONVEYOR	CONSULTANT
(1) Marginality	Because he is not "one of us" he may be excluded from inner circles of both research and practice where most sophisticated and appropriate formulations of knowledge and problems may reside.	Doesn't need to belong to "inner circle" because he doesn't need this special knowledge.
(2) Two Masters	If he is seen as serving special interests of one client, the other client may not be open to him. The client may see his information as biased or illegitimate in one way or another.	Does not put himself in the position of "selling" anything.
(3) Pain Remoteness	Must know the nature of the need in order to bring relevant knowledge to bear.	Makes sure the client initiates action.
(4) Super-expertise	Over-strains the capacity of the linker. Over-isolates researchers. Builds dependency and problem-solving incapacity in client.	Required to have only general knowledge of retrieving information, deriving solutions, and diagnosing problems; therefore avoids being seen as a "walking encyclopedia."
(5) Structural Redundancy (channel inefficiency)	He is "on-line." If he pulls out, he is in danger of disrupting flow, may not leave client with adequate skills. If he stays "on-line" manpower is lost and an additional potential source of error is created in the system.	Never puts himself "on-line"; therefore, he doesn't constitute a direct block.

to change and an openness to outside expert knowledge and an understanding of how and when to use such knowledge. Glaser (1967), for example, in a carefully controlled field experiment, found that psychological consultation developed greater client receptivity to "... research, demonstration and innovations developed by others."

On the other hand, the conveyor is needed to provide crucial technical information *at the time when the client is ready* for it. Wilkening (1956) found that the county agent was relatively ineffective as an *introducer* of new ideas, but when it came to translating innovations into practice and adapting them to personal use, he was crucial. As we have mentioned previously, detailed studies of the effective county agent show him taking a variety of roles at different stages in the adoption process (Penders, 1963; Stone, 1952)—sometimes encouraging and assisting the client with self diagnosis, sometimes providing new information, sometimes training

or retraining, sometimes providing encouragement and reinforcement.

There are a number of other roles akin to that of the "consultant" in which the involvement is not one of directly providing knowledge but rather facilitating the process. Reiff and Reissman (1964) discuss the role of "expeditor" as an ideal role for the indigenous non-professional. The expeditor is one who "sees to it that service is given" to the user. Such a person would be able to identify with client needs and concerns and yet be influential and knowledgeable about the resources of the serving system. Implicit in the expeditor's role is the idea that partisanship (on behalf of the client) is a useful and in most cases necessary stance for the linker; this represents a deviation from the consultant concept. We will return to this question later in discussing the role of "defender."

At the opposite extreme from the expeditor is the "mediator," one who is officially and legitimately objective. This notion of linkage is thoroughly legal. It assumes that knowledge producers, conveyors, and clients are all basically *partisans* and potential adversaries. Thus, relations between doctors and patients, sellers and buyers, writers and readers, and teachers and students are regulated by specific norms and rules which are codified in our legal system. This system, in turn, is administered by an officially "objective" group, the judiciary. Probably the role of the judiciary has been most prominent in the field of psychiatry (Tershakovec, 1964). The marginal status of psychiatry as a medical science leads to considerable conflict and confusion between psychiatry and the public on such critical questions as "What is mental illness?", "What is the proper treatment for mental illness?", and "What is the difference between mental illness and criminality?". Decisions on these questions are not made by the "experts" but by the judges after listening to experts and reflecting on the needs of society. The utility and appropriateness of this sort of middleman may be disputed in specific cases, but it is probably an indispensible last resort when problems of linkage have turned into conflicts.[4]

The trainer

There is probably a need to distinguish the specialized role of "trainer" or "teacher" from both conveyors and consultants despite some overlap in meanings. The trainer works on the assumption that underlies much of formal education, namely that a body of knowledge can be conveyed and stored for future use in an extended, intensive learning experience,

[4] Many readers may see this inclusion of judicial and legal roles within the linking role concept as rather muddy. It must be agreed that such persons are not primarily knowledge linkers, but only serve this role on occasion.

usually in a specialized learning environment, e.g., a school, university, summer camp, etc. The trainer is an expert who is capable of conveying large quantities of knowledge and/or complex skills but he does not typically convey this knowledge to people who are in the work setting. In contrast to the "conveyor" he tries to inculcate new knowledge prior to the time the practitioner enters the work setting. Thus the farmer's son may attend the agricultural college to be taught by professors of agriculture (trainer). Later, back on the farm, he may learn from the county agent (conveyor).

The trainer is also distinguishable from the conveyor in having a greater control over the learning environment. Typically, he has some position of authority over the learner (as teacher to student), and may use various coercive and/or reinforcing techniques which neither the consultant nor the conveyor may employ (grades, diplomas, certificates, letters of recommendation, etc.)

This review does not include any extensive consideration of the literature on teaching or the role of the teacher or trainer, and no literature is cited here. Although it is important and deserves a place in any taxonomy of linking types it is a role thoroughly understood by most readers and effectively described in other sources.

For knowledge utilization among practitioners in all fields the most vital trainer role is probably the *professor of practice.* Particularly since the decline of the apprenticeship system, our culture has relied almost exclusively on the professor of practice in the university to pass on or inculcate an understanding of a profession in the next generation of practitioners. Because of this strategic role in the socialization of the practitioner, his attitudes, training, skills, and orientation toward change will have a major impact on the progressiveness and innovativeness of an entire profession.

The chief limitation of the trainer role is the lack of continuing contact with the practitioner, especially contact in the field setting. The trainer *prepares* the new practitioner and sends him out into the world as if he were somehow a finished product. Perhaps he will need occasional servicing or recharging in summer institutes or refresher courses but essentially the trainer relinquishes any linking function after a designated training period is over.

The leader

Both the conveyor and the consultant are typically outsiders as far as the receiver-user is concerned. They are not likely to be linked to him in a formal organizational sense, nor are they likely to be related in a refer-

ence group sense of being "one of us." There are, on the other hand, a number of roles which create effective linkage through power or influence within the receiver's own group. We discuss these various role types under the designation "leader."

To begin with, there is good evidence that formally constituted leaders (administrators, supervisors, directors, presidents) do have a major effect on utilization of new ideas. Carlson (1954) has shown this with respect to school system superintendents, as has Richard (1965). Just how the administrator brings about utilization, and what sort of role he plays in the process, is more problematic, however. Some authors, e.g., Ashby (1962), seem to suggest that he is sort of a channel through which all information comes to the users. Others indicate that administrators function as "facilitators" or "supporters" of the user's efforts to retrieve and utilize new ideas.[5]

A concept related to formal leadership, but used more typically in the area of planned change and diffusion, is that of "gatekeeper." This term was first introduced by Lewin (1952, 1963) in describing housewives as the focal persons through whom influence on household eating habits had to be channeled. Many receiver systems may be so organized that there is a distinct "gate" (specific set of rules, norms, etc.) which must be passed to get free access to a group of receivers. In bureaucratic organizations this "gate" may be controlled by the "boss," the formally designated leader, or it may be controlled by some other officially designated person, e.g., editor.

The "gatekeeper" concept is significant in that it reminds us to note the channels and barriers which represent the client-user system and the access routes to it. The gatekeeper is the one who holds *the strategic position.* The gatekeeper can be the formal leader, but organization charts and official power may be misleading. In most parts of the world, for example, the oldest male is the head of the household and is accorded the highest prestige. Nevertheless, it may be the female who controls access to those critical areas of personal life which are of most concern to the development worker, as, for example, in the dissemination of birth control information, sanitation procedures, food preparations, etc. Cama (1963), for example, notes the great potential of utilizing women in development programs for these reasons.

The formal leader and the gatekeeper (strategic role holder) are both to be distinguished from the *opinion leader* (Katz, 1957). There is a large body of literature supporting the view that the vast majority of those

[5] Chesler et al. (1963), on the role of the school principal, and Carey (1961) on the role of the university president in the development of evening colleges.

who eventually adopt new ideas do so because they are influenced by some other member of their own group. When this pattern of imitation is focused on one particular person and is stable over time and across a number of innovations, we can speak of "opinion leadership."[6]

That judgments and attitudes are influenced by the *social* environment is a well established fact in social psychology. People do have a tendency to conform to the opinions and behaviors of those around them, not only in unstructured situations,[7] but even where there is direct sensory evidence which contradicts those opinions and behaviors.[8] This phenomenon of conformity in itself may be responsible for many kinds of adoption behavior, but there is considerably more which should be understood to appreciate the opinion leadership concept. For one thing, conformity is not typically blind acceptance of what anybody who happens to be present is doing or saying; there are spheres of conformity, specific kinds of groups, often called "reference groups," within which there is likely to be high conformity on certain issues. In other words, people are distinctly selective in their acceptance of the opinions of others, and their selectivity is based largely on prior experience and background. For example, most farmers have most of their discussions and exchanges about farming with other farmers. Therefore, naturally, "other farmers" are their reference group for new ideas on farming. Some farmers have had many successful encounters with the extension service. In these cases the county agent may become a member of the farmer's reference group and the conveyor and opinion leader functions may be fused. Thus Beal and Rogers (1958) find that the agricultural scientist is a significant referent for the most innovative farmers.

The county agent example is offered to make a point: reference groups can form on a *rational as well as non-rational basis.* There are certain people one trusts for new information and there are certain people one doesn't trust for information, but this kind of trust may have little to do with personal friendship or liking. There is no doubt, of course, that friends and neighbors do play a critical role in the adoption process (Abell, et al., 1957; Anderson, 1955; Lionberger and Hassinger, 1954). Yet the influence they exert may not be based solely on "good fellowship." Indeed, if experience has told us that our friends are not reliable sources of information, we will often ignore their advice. What counts is our perception of others as relevant information sources and relevant role models

[6] Actually, this definition is not universally accepted and there is a need for clarification. See Rogers' discussion (1962), especially pages 209-214.

[7] Sherif's classic experiments using the autokinetic phenomenon (Sherif, 1936).

[8] Asch experiments asking subjects to compare lines of various lengths in Maccoby, et al. (1958).

and/or exemplars. It is not so much "being like me" as "being what I aspire to be" or "being what I would be if I could." Thus both Blackmore (1955) and Wilkening (1952), in different settings, found that test demonstrators who were effective were seen primarily as "good farmers."

Discussions of opinion leadership have typically focused on what is known as the *two-step flow of communication* hypothesis, first introduced by Lazarsfeld and others (1944) in an analysis of voting patterns in 1940. According to this hypothesis, mass communications media, which are presumably beamed at the public as a whole, actually influence only a small portion of externally oriented, media-oriented, people. It is these people who in turn influence the remainder of the public through their opinion leadership.

The theory has proved to be problematic in many ways (see Katz, 1957 and Rogers, 1962), particularly in implying: (a) that there are *only two steps*; (b) that there is only one channel through which a given individual may be influenced; and (c) that those who are influenced by media are in fact the most influential people, i.e., that media-oriented people are opinion leaders. Extensive literature surveys of the diffusion process, e.g., Rogers (1962) emphatically contradict all three of those assumptions.

The point which should be made here is the need to know how the opinion leadership is constituted and organized. We should recognize above all that opinion leadership is something which is present in every social system and every reference group, but we should not assume that such leadership, when found, will be progressive, i.e., that it will encourage the adoption of new ideas. Hoffer (1941) notes that "high quality and quantity of well-recognized *extension-oriented* leadership were all found to be positively related to success of the extension program." In other words, the extension service depends for its success on a core of progressive leadership in the client system. This same point is made by many who have discussed the problem of national development. For example, Hull (1961) states that there must be an elite of *powerful modernization proponents* before technical assistance will "take." Otherwise, advice will be ineffectual. Interestingly enough, the same point has been made about introducing change in our own urban communities in the United States. There needs to be a stratum of informal (as distinct from purely political) leadership in the community which is not only effectively oriented toward new ideas from outside but which is also effectively linked to the "followers" within their own community. This has been demonstrated in survey studies of the social integration of American cities (Angell, 1951).

The importance of opinion leadership, in contrast to formal leadership, probably relates to the degree of formal coordination of the user social

system. Presumably, the more loosely structured the system the more important is the role of opinion leadership. Thus, in farming (individual land holdings), in much of medicine (individual physicians working out of their own offices), and in the academic world (individual scholars working on independent self-determined research projects) colleague influence may play a determining role. It is less clear what constitutes opinion leadership *within* bureaucratic structures, i.e., among organizational scientists, hospital staffs, government departments, corporation employees, and school system personnel. It might be argued that opinion leadership is an important concept for these groups also, but only *among the leaders of more or less autonomous units* (e.g., among directors of laboratories, hospital administrators, corporation executives, and school system superintendents).

Before leaving the concept of "opinion leader" we should also see how it relates functionally to the "conveyor" and "consultant" described above. Katz (1957) suggests that the opinion leader serves three purposes for the receiver-users: he provides (1) *information* (conveyor), (2) a standard to follow (*conformity* to reference group norms), and (3) *social support* for adoption decisions. In other words, he seems to serve similar or overlapping functions to those of conveyor and consultant. It would appear, however, that the distinctive aspect of the opinion leader is his *insideness*. The opinion leader is above all a *legitimator* of new ideas and practices.

Anyone contemplating a program of diffusion should consider the implications of opinion leadership and legitimation. In a stable client system with identifiable and strong indigenous opinion leadership, it may be a wise strategy to choose the opinion leaders as primary communication targets. But when this leadership is not strong, the attempt to make them *inside change agents* may alienate them from the rest of the client system and disrupt whatever community coordination may have existed previously. At the same time, to select members of the client system who are marginal in status and isolated from other members is equally fatal to a change program, unless some means are found for legitimating these insiders to their colleagues.

The innovator

Another type of role sometimes confused with the opinion leader but clearly distinct both conceptually and empirically is the "innovator," the first person or persons to take up a new idea. The "innovator" may or may not be original in an absolute sense as an inventor but he may be

the first to adopt a new idea within a particular social system and hence the originator as far as that system is concerned.[9]

One might ask why the "innovator" has been included as a "linking role." Does he really link to anyone, or is he simply an accidental by-product of the diffusion of knowledge? It seems that the innovator may indeed be a linker in several ways. First, he may be a latent opinion leader, perhaps through the success and the prosperity which may result from being an innovator. This may be the way in which Blackmore's (1955) and Wilkening's (1952) test demonstrators came to be known as "good farmers." Through innovation they developed well-run profitable enterprises; other farmers seeing them prosper wish to emulate them.

A second way in which innovators serve as linkers is as demonstrators and quasi-opinion leaders *for the real opinion leader*. The opinion leader may be reluctant to stake his reputation on an untested product or practice. If he is able to see how someone else (the innovator) fares before he starts, he is in a safer position. This type of flow pattern depends, of course, on adequate linkage between innovators and opinion leaders. If it is true that innovators are isolates, viewed as "cranks" and "oddballs" by the rest of the social system,[10] then there is little hope for this type of linkage. Under these conditions opinion leaders would avoid innovators. Such may well be the case, particularly in very conservative social systems.

The relationship between opinion leaders and innovators still needs clarification. Menzel and Katz (1955-56) found an inverse correlation between early adoption of a new drug (innovation) and opinion leadership among doctors. They use this finding to suggest that the innovator acts as an "advance scout" for the opinion leaders in much the same way as we have suggested here, but the linkage between the two (the innovator and the opinion leader) is left unexplained. They note that rural sociologists have found similarly inconsistent relationships between opinion leadership and innovativeness. To this knot, another loop is added by noting that those contacted directly and those influenced indirectly may be in the same group. Many studies have shown[11] that such factors as higher education, higher social class, larger farms, larger income and cosmopolitan orientation, characterize the farmers who have more contact with the extension system. If these correlations represent a cluster of attributes which define a very special subgroup, one implication might be that linkage between this group, loaded as it is with potential opinion leaders, and the larger group of low education, low income, small farm,

[9] This definition is very close to Rogers (1962).
[10] As Barnett (1953) would have us believe.
[11] Rogers and Capener (1960) and many others cited by Rogers (1962).

localite farmers, may be a real problem. Clearly research is still needed to untangle this problem, to discover if and how the chain of influence from innovator to opinion leader to opinion follower works.

A third way in which the innovator may become an effective linker is through the active advocacy of the innovation. The innovation advocate may be a particularly useful role *within* large bureaucratic structures where profit does not depend exclusively on self-initiative but more on one's reputation in the system and one's contribution to the success of the group.[12] Schon has given us some illuminating case examples of how "product champions" operate in industry (Schon, 1963; Nader, 1967). It is sometimes the case that the inventor, himself, champions his own product, becoming sort of a missionary on his own behalf. Schon finds, however, that at least two and possibly three roles are involved in adoption of innovations in an industry. First, there is the inventor; second, there is the champion, a man who sees the value of the invention, comes to believe in it, and decides to devote all his energies to selling it to top management; and finally, there may be a third role of backer or "patron," someone in high power and high monetary position who is persuaded by the champion and allows him to become an *entrepreneur* by giving him risk capital.[13]

Although Schon to a great extent is bemoaning the inadequacy of the utilization of new ideas in industry, particularly when they are from "outside," the "champion" concept may provide an important key to effective utilization in many fields, especially education. The big factor here is motivation, the total involvement and investment of self in the innovation. This is what separates the champion from the bureaucratic errand boy concept of the conveyor, which we discussed earlier.

The defender

As discussed up to this point, the linking role has always been viewed positively as facilitating, speeding, easing, expanding the flow of knowledge. There is another side to the coin, however. We know that not all change is good, and not all resistance is misguided and perverse. On the contrary, it may be that *all* new ideas and changes bring with them *some* problems and some reasons why adoption is not advisable. It is partly for this reason that sophisticated knowledge-linking systems require checks and balances.

Previously, mention has been made of the "gatekeeper," one who stands guard over the entry points to the client system, but there is also

[12] A situation which does not hold in agriculture or in private medical practice.
[13] Columbus must be the classic case of this type.

a more active role of *defender*, one who champions the client against innovations.[14] It has been traditional to think of individuals filling such roles primarily in a negative way as blockers, unwanted nuisances, and hindrances in the path to progress. Some authors, e.g., Klein (1967), however, see the defender as having a more benign influence on the process. The fact is that some clients and some client systems are too open to change and to adoption of new ideas, too unaware of the pitfalls of innovations, too vulnerable to the dangers. The defender is always on watch for these dangers, always ready to sound the trumpet to awaken the public. In so doing, he may, of course, merely compound the linkage problem by making the client more defensive, more suspicious, and more hostile to anything new. On the other hand, he may be playing a creative role in: (a) sensitizing the consumer to important value concerns;[15] (b) spurring a re-examination and re-diagnosis of needs;[16] (c) mobilizing public opinion to demand more adequate products and services;[17] and (d) developing a greater public sophistication and selectivity in evaluating the quality, value, relevance, and feasibility of innovations.[18] Large scale attempts to institutionalize defender-like roles in the urban ghettoes using indigeneous recruits have been noted by Kahn, et al. (1966) and Reiff and Reissman (1967).

One of the most vital tasks in the utilization of knowledge is the communication of negative information. To forestall and especially to reverse an adoption process once begun may be a more important and yet more difficult task than bringing about the acceptance of innovations. The history of smoking would appear to be the classic case of this. The first part of the twentieth century witnessed one of the most effective diffusion campaigns of all time. Hundreds of millions of men and women of all classes in many countries adopted cigarette smoking. Now in the 1960's we are struggling to utilize scientific knowledge on the hazards of smoking, with very little effect. The defender tries to prevent these situations from happening by forestalling change until such irreversible risks are thoroughly examined. Francis and Rogers (1960) have noted that this is one important function of the county agent. Tracing adoption behavior for a non-recommended innovation which was on the mark (the "grass incubator"), they found that non-adoption was correlated

[14] Contrast Schon's "product champion" (1963).

[15] Fluoridation: the involuntary medication issue. Even groups sometimes seen as "lunatic fringe" may be functional in this way on some issues.

[16] Upton Sinclair, on need for pure food and drug legislation.

[17] Nader on automobile safety.

[18] The role that the Consumers Union is able to perform on a limited scale.

with agent contacts. In this case the county agent was an effective defender against pseudo-innovations being pushed by commercial conveyors.

Although the imagery is legal, the implicit assumption behind the "defender" concept is thoroughly scientific, i.e., the critical and objective *evaluation* of all practices, products, and ideas, regardless of the claims of their champions. This concept has a kinship with such scientific roles as the evaluation researcher, e.g., the role of social scientists in community development projects (Hendricks, 1963), Hencley's (1967) "quality controller," and the "development" role of "testing and evaluating solutions and programs," included in the Clark-Hopkins (1966) paradigm of R & D roles in education. The Consumers Union and its publication *Consumers Reports* play such a role for our society at large.

Of course, the defender role is not always a benign influence. The defender may sometimes be *committed* to resistance to the point that he is still resisting and preventing diffusion long after the value, relevance, and safety of an innovation have been clearly demonstrated. Even the most perverse manifestations of the role may *still* be functional, however, in serving as markers of latent resistance in the client system. The skillful change strategist can steer a course around these markers, avoiding what might be icebergs of latent hostility and anti-change sentiment.

Knowledge builders as linkers

In discussing the "defender" role above, it was noted that the scientist plays a key defense role by evaluating and critiquing new knowledge. We should now like to turn to a more detailed consideration of the part played by scientists, scholars, engineers, and other knowledge builders in the processes of dissemination and utilization. To the extent that such people operate as linkers to the world of practice or to the consumer, they may do so half-consciously (and sometimes, we fear, half-heartedly) because they see their primary functions as builders, not transmitters.

But do these builders, in spite of themselves and their own self-images, assist in the knowledge-linking process? Some good evidence suggests that they often do, depending on how they are positioned in the social system and how they are used by others.

The basic scientist and the scholar as linkers

Earlier in this paper we noted how the basic scientist who is a star, among the most respected in his field, comes to be known as an "expert" and is called upon by government policy makers and others in the world of practice. The importance of these distinguished leaders of science goes

beyond this, however. The high ranking basic scientist is in a real sense the *gatekeeper to the world of science.* He defines what is scientific and what is not, and he is responsible for the maintenance of the standards of science and empirical "truth" (Znaniecki, 1940).

At the very least, it must be said that such a role of defender and champion of basic knowledge is indispensable. Without it, we would have no scientific knowledge at all.

Another equally important role for the basic scholar is that of *supreme generalist* and general educator. Partly because he is removed from the hustle and bustle of everyday dealings with everyday problems, the scholar can consider the basic implications of new knowledge and can integrate disparate findings into theories that make sense out of the whole and show us where we are going. These sweeping overviews of knowledge are disseminated to the next generation through classroom teaching and textbooks in the university indirectly and through curricula in the schools.[19]

Yet another way in which some scholars, particularly philosophers and some social scientists, may influence the utilization of knowledge is in being the *definers of basic human values and directions.* These are the people who help us answer questions such as: "Knowledge for what?" "What is progress?"; "What is well-being?". There is, to be sure, some dispute about who ought to be the definers of such fundamental questions. Ayn Rand would have us leave it to the philosophers. Traditionally, it may have resided in theologians, mystics, and prophets (Znaniecki, 1940). Perhaps there should be no final arbiters on such questions. Nevertheless, it would seem that someone should be helping us to think through these weightiest of all knowledge utilization questions.

Finally, there is the semi-scholarly role of "future planner" or "futurist." Knowledge utilization systems must not consider only the short run in terms of months and years. There must be some individuals devoting a large amount of their time to a more long-range future a decade or a generation beyond the present. Very recent developments in education indicate a growing recognition of this planner role. Recently the Office of Research in the U.S. Office of Education commissioned a number of scholars in various institutions to prepare descriptions of society and societal needs in the 1980's. Even at the local level there may be a role for

[19] It is important not to confuse this scholar role with the role of educational researcher. Ironically the *basic* scholar may be responsible for more innovation than the applied man. For example, Carter and Silberman note: ". . . the moving of advanced topics down to earlier grade levels and the new curricular materials are the products of the subject-matter scholar rather than the educational researcher." (1965, p. 4)

futurists, however. Kurland (1966) believes that State Departments of Education are the ideal locus for future planners, and some California experiments now underway may show us that even at school district level long-range planners can be functional (Miller, 1967). Thus, the planner concept is now definitely with us. Where the role belongs in the structure of education and what its focus and range of concern are to be are issues yet to be resolved.

Applied researchers, developers, and engineers

When we move from basic to applied research the implicit linkage assumption becomes inescapable. An applied researcher is inevitably someone with a dual orientation, looking toward "research" on the one hand and "application" (making something practical, something useful) on the other. The necessity of facing in two directions simultaneously may make life difficult for the applied researcher but it does allow him to fulfill a linking role. The importance of applied researchers as linkers is related in part to the inadequacy of the conveyor concept. The fact is that few conveyor-type linkers are capable of retrieving knowledge from basic research, screening and packaging it, and at the same time transmitting it to the user. There is a great need for a division of labor between the processing and the transmitting aspects of this job. Earlier we saw this in the division of labor between the county agent and the extension subject matter specialist. Even the specialist, however, by his own admission, does not feel competent to interpret research findings as such to practitioners and county agents (Brown and Deekens, 1958). Hence, for many kinds of research dissemination, the researcher may be the only competent conveyor.

The types of activity listed by Clark and Hopkins (1966) under "development" give a good idea of the range of activities in which applied research and development people are engaged: "inventing solutions to operating problems," "engineering packages and programs for educational use," and "testing and evaluating solutions and programs." All these definitions imply that the R & D man *translates* research into usable services and products. Through this translation-adaptation function the R & D man does truly serve as a linker between research and practice.

Most of the literature on these applied research and development roles comes from industry,[20] perhaps because the concept of the R & D labora-

[20] For example, see the work described by Abrahamson (1964); Morton (1964); and Stein (1966).

tory really originated there.[21] What the literature emphasizes is the constant struggle between company goals on the one hand and individual research and professional goals of the scientist on the other. The fact is that industry still does not really know how to utilize science effectively. Much of the problem may be traced to the socialization and the self-image of the scientist. The organization expects effective dissemination and linkage to *them*, not to the scientific fraternity. The scientist, on the other hand, is reluctant to see practical concerns as paramount or co-equal to scientific ones. Nevertheless, we want to emphasize that the scientist who is successful in industry is a true linker; he is creating a bridge from scientific knowledge to use.

The R & D manager

The linking function of R & D is most fully realized in the role of R & D manager, the man who must attract and hold high calibre scientific talent and at the same time justify the work of the laboratory in terms of improved product quality and new marketable products. His job depends on the lab being useful to the company. To fill the role it is not enough for him to simply have background and training in management. He also needs to have an understanding of scientific values and methods. (Krugman and Egerton, 1959; Neff, et al., 1965).

Within education the concept of R & D management is still underdeveloped, but the review by Sieber of the organization of educational research highlights the importance of the role of "director" of educational research bureaus and "research coordinator" within the school of education—role designations which have only emerged within the last decade (Sieber, 1966).

The power of the applied research and applied research management roles, in contrast to the pure conveyor discussed earlier, resides in the potential for genuine two-way flow. The R & D manager is capable not only of translating research into practice, but also of translating practice needs and concerns into researchable problems. He provides the vital stimulation which the research world needs from the everyday world. In this connection, the consistent findings by Pelz and Andrews are worth noting: that scientists and engineers who participate in management and dissemination activities are more effective and more productive *as scientists*, judged by criteria of publications and ratings of scientific excellence and overall usefulness (Pelz and Andrews, 1966). These findings

[21] However, with the growth of the regional educational laboratories and educational R & D centers which have U.S. Office of Education support, we can expect this picture to change.

are in sharp contrast to the popular view that scientists are most effective only in cloistered and strongly protected environments.

The advantages of diversity may not apply to all types of non-research activity, however. In his research, Sieber (1966) found that educational research directors who are assigned the role of providing *services* in addition to research were less productive than those who could spend full time on the research mission.

Engineers

Hardly distinct from other applied research and development roles is that of the "engineer," a term which has an increasingly hazy meaning within the industrial world.[22] The engineer is someone who has a broad scientific and technical training and who can be used by industry in a great variety of roles, e.g., as applied researcher, developer, conveyor, and consultant. Largely, what an engineer has in the way of specific skills he learns on the job. It is not clear, therefore, what some educators mean when they say we must have "educational engineers" (Anderson, 1961). In fact, we probably have them already in the form of "curriculum leaders" (Babcock, 1965), curriculum developers, e.g., PSSC (Clark, 1965), curriculum coordinators, school psychologists,[23] and many other existing roles in the educational establishment.

Deploring the gap between the vast quantities of learning research in experimental psychology and the training practitioner, Mackie and Christensen (1967) urge the formation of a "corps of professionals who may be described as *learning engineers*." They say that these engineers should be highly trained and qualified as critics of learning research and experts in the learning process, who will be able to relate "theoretical, laboratory, and real-world variables," to assess the meaning of research findings, and to invent applications.

Emerging roles in educational engineering are too numerous and as yet too recently conceived to be listed here in detail. The newly established regional laboratories, ERIC centers, "Title III" Centers,[24] and IDEA Centers[25] have spawned numerous role-types which fit within "engineering" or "development" or "linking" designations. John E. Hopkins and others (1966) at Indiana University have tried to bring together a number of these in the working paper: "Exemplars of Emerging Roles."

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[22] As noted by J. W. Forrester of M.I.T. in a recent address to the National Academy of Engineering.

[23] Especially as envisaged in the Chicago plan of COPED, The Cooperative Project for Educational Development.

[24] All of these sponsored by the U.S. Office of Education.

[25] Sponsored by the Kettering Foundation.

Practitioners as linkers

As we have used the linking concept in this paper, we have typically been referring to linkage *to the practitioner, e.g.*, the physician, or the teacher. Yet we realize that the practitioner is not the user in any ultimate sense. We only wish to help the practitioner to become more effective in serving *his* clients, the general public, the consuming public, students, patients, the needy, or whatever. It is appropriate, therefore, to view the practitioner, himself, as a linker of knowledge to the ultimate consumers. Earlier we listed the teacher-trainer in this role, but it is equally true that anyone who provides specialized services, whether he be a plumber, a manufacturer, a physician, or a mechanic, is imparting to the public some elements from our vast collective cultural knowledge bank. To the extent that such services reflect *new* and *scientific* knowledge these practitioners are serving as linkers.

It may be important for us to look at the practitioner from this angle in assessing some of his deficiencies. There can be an overemphasis on *professionalism* and *specialization* in some occupations, which may weaken the linkage to the consumer, e.g., by making it more difficult for him to know where to go to be served for particular needs. In medicine, where these trends are particularly marked, some have advocated the revitalization of the *general* practitioner role, someone who would be able to interpret the needs of the patient as a whole to the various specialists (World Health Organization, 1962). In education, efforts to make the classroom "student-centered" reinforce the image of the teacher as a linker (conveyor, consultant, trainer).

An alternate solution would be to develop a special kind of linking agent for the consumer, a role already existing in Britain's Citizens Advice Bureaus (CAB's) (Kahn, et al., 1966), and in the early stages of development in recent federal programs for the poor. To be effective, these generalists must be equipped not only to provide information but also to provide emotional help, referral, feedback, and, at times, to undertake advocacy of the client's interests.[26]

Actually, these most generalized consumer-linker functions have been part of the AES county agent role repertoire for many years. Not only does the county agent provide information on specific agricultural practices, but he serves also as a youth worker, home economics expert and advisor, and organizer and coordinator of multitudinous community events (Stone, 1952).

[26] See again the section on the "defender" role in this connection.

The user as linker

With the brief analysis of the generalized linkers just presented, we have now come full circle to the question with which we began. Are linkers necessary? Can the user serve as his own linker? Reviewing the various functions which seem to have been necessary to bring knowledge to the user, translating basic knowledge into useful products and practices, retrieving and transmitting, screening, adapting, testing and so forth, one might say that the task of the user doing his own linking would be overwhelming. Even so, there is merit in the argument that the user should be his own linker and it is based on one central fact: *the user is the only locus of primary need.* It is for him and only for him that the knowledge is useful.

In order to be his own linker, the user must have or acquire three things: knowledge of resources, access to resources, and diagnosis of his own need. It is possible to give people *knowledge* of resources through training, a good "general education." It is possible, in a technologically advanced society, to provide many people with ready *access* to these resources, and it is possible for sensitive, self-aware, self-critical, and secure people to make pretty good *diagnoses* of their own needs. But it is very rarely that we find people fully equipped in all these respects. Moreover, when we speak of "underdevelopment," at home or abroad, in the ghettoes, in the countryside, in hospitals, industries, or schools, we mean that there is a serious deficit in all three of these areas.

It is probably true that as knowledge utilization in a particular field improves over time, the need for intermediary roles declines. Thus we find that the most sophisticated farmer, with long experience with the extension service, and training at the agricultural college, does not rely on the county agents quite as much as do some other farmers. If he wants something new, he knows that he can pick it up from the university and from the research literature long before the county agent is likely to come around with it (Rogers, 1962; Havelock, 1967). But even in a very advanced system, like U.S. Agricultural Extension Service, this pattern is the exception, not the rule. Hence the general conclusion must be stated emphatically: FOR THE FORESEEABLE FUTURE ALL FIELDS OF KNOWLEDGE WILL REQUIRE THE INSTALLATION AND SUPPORT OF A VARIETY OF LINKING ROLES IF EFFECTIVE UTILIZATION IS TO BE REALIZED.

Summary of discussion on linking roles types

In offering this typology of linking roles we have tried to cover all the important functions which, together, are needed to establish and maintain

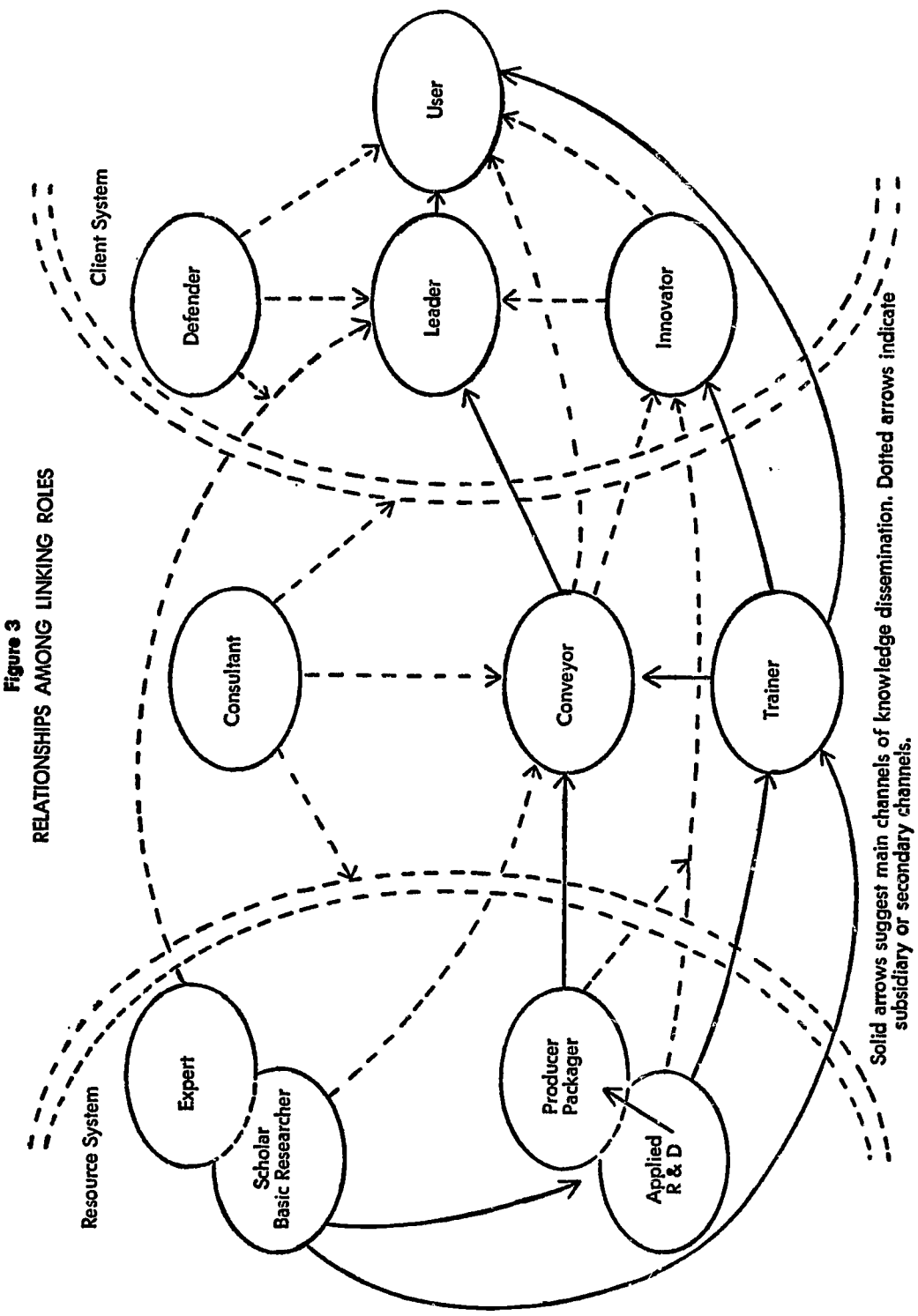

Figure 3
RELATIONSHIPS AMONG LINKING ROLES

of knowledge dissemination. Dotted arrows indicate
ls.
Solid arrows suggest main channels of kn
subsidiary or secondary channels.

linkage between knowledge sources and resources on the one hand, and users, consumers, and clients on the other. We say "together" because we believe that they should be seen together, forming among themselves an interlocking chain. FIGURE 3 is an attempt to illustrate this story.

On one side of this figure we have a vaguely defined network of roles which could be described as the "resource system," including the knowledge builder, the experts, and the producers. Many of the roles within this system are capable of several kinds of output to several kinds of audiences. Experts are influential largely through their contact with community leaders, including the top layers of government. Scholars and basic researchers, of whom the experts are essentially a sub-class, exert their influence largely through applied research and development but also influence the general public (all consumers) through their guardianship of general education and academic curricula, and through their participation in the training of the next generations of practitioners and users. They may also influence the public through intermediary conveyor roles such as the science reporter.

Applied R & D influences the user either through conveyors, such as extension specialists and county agents and perhaps now also through the regional laboratories in education, or, more commonly, through producers (manufacturers, publishers). The producers in turn rely on such conveyors as advertisers, salesmen and retailers to move their products on to the consumer. Since much of applied R & D takes place in the professional schools attached to the university, by people who wear two hats, researcher and trainer, the trainer-linker also needs to be seen as an important dissemination channel for applied R & D.

On the other side of this figure we have another vaguely defined region which has been called the "client system." It includes first of all the *user*. He could be the ultimate consumer, the patient in medicine, or the student in education, but for the most part within this presentation he is seen as the individual *practitioner*, the practicing physician, the teacher. Just who the "user" is, of course, depends on the type of knowledge conveyed. If, for example, the knowledge to be disseminated and utilized is on *educational administration*, then the typical superintendent and school principal are the "users," and so forth.

Relating to the user in a very direct way is the *leader*, whether he be the officially designated leader or the informal opinion leader. For the most part, the majority of users depend on the leaders of their reference groups for decision-making on adoption of innovations. Users and leaders depend to some extent on *defenders* to screen new knowledge for them and to alert them to hidden dangers, and they may also depend on *inno-*

vators to advance-scout and pre-test new ideas, to be their guinea pigs.

Between the resource and client systems we have positioned the *conveyor*, the *consultant*, and the *trainer*. The conveyor receives knowledge in various degrees of packaging from all parts of the resource system and transmits it directly to leaders and innovators within the user group. He is aided by the consultant, who prepares the client system for acceptance of new ideas, helping to diagnose the needs and giving help in *adapting* new ideas to local conditions. The consultant can also aid the conveyor by advance scouting, indicating the most favorable times, places, and persons for introducing innovations to the client system. The trainer transmits new ideas, skills, and innovations through education, especially education of the next generation of practitioners, but also through retraining and in-service training of present generations.

Finally, it was also noted that effective linking agents, in reality, are able to perform in several ways, as conveyors, consultants, defenders, and leader-coordinators for the client system. In particular, we find this multiple role capability in the county agent of the agricultural extension service. However, questions about the optimum division of labor in the linking process and the methods by which several linking roles can be coordinated will be put off until the next section.

The Linking Role in Its Institutional Context

It is probably not very meaningful to discuss linking roles outside the institutional-organizational context in which they are embedded. In the preceding section we had occasion at several points to touch on institutional questions, particularly in the discussion of leadership, and wherever mention was made of installing, coordinating, and combining roles and building lasting interrelationships among them. We also touched on institutional issues when we spoke of where roles come from: the "Agricultural Extension Service," the "Office of Education," the "industrial corporation," the "university," and so forth. Indeed, institutional factors are ubiquitous in any analysis of the utilization process. In this section we will try to nail down some of these issues as they pertain to linking roles.

There are three institutional questions of highest relevance to the topic of linking agent: first, what sort of institutional barriers, both in the resource system and in the client system, most frequently affect knowledge dissemination and utilization? Second, what kind of institutions are most effective for fathering (supporting, controlling) linking roles? And third, what kinds of institutions serve as linkers?

Institutionalization in resource and client systems: its effects on knowledge linking

In FIGURE 3 the resource and client systems were presented as two large and vaguely defined regions between which knowledge must pass. We now ask: How are these regions defined and how do these definitions affect knowledge flow? Institutions are more or less permanent structures through which society assures the performance of certain functions. Thus the existence of institutions should be the proof of society's good intentions with respect to knowledge utilization. If knowledge utilization is seen as an important function, there will be institutions which directly and indirectly *facilitate* it.

Institutional barriers in the resource system

When we look at existing institutional structures in our society the vista is not too encouraging in this regard. The primary institutional form in which the resource system is realized is the university. The university is the focal center of all the expert resources, stored cultural heritage, scientific knowledge, and scientific knowledge-building capacity of the entire culture. Yet, as it is typically structured, access to the university and utilization of university resources by non-academic people is strictly circumscribed. The primary repository of all the expertise of universities is the faculty, a very tight reference group with the highest standards of membership (most advanced degree offered in the specialty and proven expertise through publication and recognition). Within the faculty, knowledge may flow relatively freely, but informally. Faculty members view themselves as autonomous and guard their "academic freedom" vigilantly. As a result, any attempts to coordinate their efforts or systematize their communication patterns are resisted with vigor.

The typical faculty member probably does not like to think of himself as a linker and probably has the image of the linker which Halpin describes (see again the discussion of "conveyor"). There are, however, two thoroughly legitimate ways for academic faculty members to dispense knowledge: first, through the courses taught in the academic curriculum, i.e., as *trainers*, and second, through publications and papers addressed primarily to *colleagues*. Even in teaching, however, favored treatment is generally accorded students who are concentrators, especially honor concentrators, and graduate students, since these are potential recruits into the academic world, hence future *colleagues*.

Linkage of a sort does occur through the establishment of professional schools as a part of the university establishment. Here too, however, fac-

ulties operate on very much the same norms, addressing their primary efforts to communicating among colleagues and to training neophytes. Extension and continuing education are relegated to secondary status if they are handled at all. Carey's (1961) account of the development of evening colleges within this university illustrates the marginal status accorded extension activities by all other university divisions.

Ironically, in spite of its mimicry of basic academic norms, the professional school remains as a marginal component of the university in the eyes of many academicians. Faculty members recruited from academic departments to professional schools are treated as lepers by former colleagues even when they join the established and prestigious faculties of medicine. The fact is that the typical university is pervaded by an attitude which denigrates practice and practical concerns. On the one hand, this attitude makes the special role of linker all the more vital since the resource persons themselves lack the motivation and cannot be relied upon for effective linkages. On the other hand, the attitude makes it all the more difficult for the linker to link effectively to these expert resources. Even such models of effective linkage as the agriculture extension service's subject matter specialists are likely to be accepted as only marginal members of the agricultural college. Richert (1961) notes that in spite of an official pattern of trifunctional *units*, including resident instruction, research, and extension, the extension specialists (in home economics) were a part of this team in only one-third of the nation's 50 land grant colleges.

The client system: two patterns—colleaguial and bureaucratic

Turning now from the resource system to the client system, two principal institutional patterns emerge. The first, not unlike the university in some respects, is the "profession," a high status group of independent operators bound together in a reference group with exceedingly tough membership prerequisites. Specifically, this pattern is exemplified by the legal and medical fraternities. But there are major differences between these groups and the university: First, attorneys and physicians are dispersed throughout the community and are likely to have extensive contacts with a great variety of clients. Second, they are not primarily oriented to sharing knowledge with colleagues or to building knowledge as such. Thirdly, they are primarily oriented to providing *service* and to being practical. There is, therefore, motivation to receive knowledge and a capability of understanding it in relatively complex unpackaged forms.

In spite of those factors which would make them ready targets for new knowledge, lawyers and physicians in private practice are not linked to the university based expert resource system to any extent. Apart from

the drug detail man, the practicing physician has no ready access to such expert sources through any medical extension service. For lawyers, the lack of linkage may be partly a problem of orientation. The law is seen as based on tradition and statute rather than on science, so that the needs of lawyers are most likely to be perceived in terms of ready access to court cases and laws. To some extent lawyers are adequately serviced by publication of all court cases and continuously updated legal encyclopedias to which all lawyers have ready access. It seems doubtful, however, that these devices substitute for a fully developed network of legal extension specialists.

When we compare these more exalted professions with the farmer, it appears that the latter is well served, indeed. In spite of barriers and hurdles represented by geographical dispersal, relatively low educational background and scientific competence, and the vast cultural separation from the academic world, the farmer has access to and uses a great number of innovations directly based on scientific knowledge. He is able to do this largely because of a system of linking roles, both governmentally and commercially supported, designed to serve him.

But practice in the client system is also institutionalized in another way, in bureaucracies, and it is probable that the problems and opportunities for linkage under these circumstances are quite different. Bureaucracies, whether we are talking about businesses, schools, or hospitals, are characterized by a formalization of division of labor, leadership, and interdependence, which is absent in the organization of the professions discussed above and only vaguely present in the university. The presence of any of these three attributes, (1) *specialization*; (2) *leadership*, and (3) *coordination*, should, in theory, facilitate linkage.

1. With specialization there should be an increase in competence within the specialty, a better definition of the requirements of the role and its resource needs, and an easier task of retrieval from a more limited knowledge store.
2. Where effective leadership exists, as noted earlier, it is possible to influence more people more successfully. An effective leader in a well-organized system is related to all other members through overlapping group memberships which allow influence to be shared and to flow downward and upward easily (Likert, 1961). If the leader in such a system is made aware of new and useful knowledge, he can become an *inside change agent* or catalyst.[27]

[27] Schein and Bennis (1965) note the success of this model exemplified in the organizational effectiveness of a clothing manufacturing concern headed by a social psychologist in close contact with outside social action researchers.

3. Influence through leadership may be relatively ineffective, however, if the organization is poorly coordinated. Such lack of coordination could be reflected in mutual distrust and hostility between hierarchical levels or across specialities and among colleagues. A major aspect of organization health is the ability to cooperate and to keep lines of communication open.

Bureaucratization of the client system does not necessarily make dissemination of new knowledge more difficult. On the contrary if the client system bureaucracy is in a healthy state with respect to the three dimensions listed above, then dissemination and utilization will be far more rapid and effective than it ever could be under the colleaguial pattern.

Effective institutional fathers for linking roles

Having considered the types of institutions with which linkers have to cope, we can now turn to consider the types of organizations in which they should be based: first, the general type of base or parent organization in which they should be embedded, and then the type of sub-unit or "linking institution" in which they can be organized.

Five primary types of institutional bases should be noted: university, government, commercial, practice, and independent. Let us look briefly at each in turn.

The university

The university, as discussed earlier, is not the most hospitable home for the linker, particularly if he is unable to show many credentials to back up his claim to expertise. The weakness of extension services run by universities seems to attest to the continued unwillingness of the university to indulge in the kind of linkage to practitioners and consumers which comes under the loathed heading of "service."

There are some kinds of linkage which do typically come under the university wing, however. One of these roles is that of the high level expert. He has the credentials and his status within the university is secure enough that he need not be very concerned about engaging in marginal activities. The other role is that of the applied researcher attached to university centers and professional schools. But many questions need to be raised about the university's role in knowledge utilization. Is the university the proper locus for the kind of applied research which is useful to practice and disseminable to practice? Certainly in agriculture this does seem to work; in technology and medicine it is more difficult to judge its effectiveness. In education, even with the recently established

R & D centers, the production of useful knowledge seems to be a pitiful trickle in proportion to the investment.

Part of the dilemma results from the difficulty of assessing the utility of knowledge generated within the university; there is no accounting, no assessment of what is done in terms of value to society, nor is the research administrator in the university under any pressure in this regard. The orientation is inward toward the university and to evaluation by academic colleagues. Productivity is measured in terms of number of articles in "prestige" journals, not in terms of the number of people helped or number of people informed. (See again Mackie and Christensen, 1967, on learning theory research.)

Government

Knowledge linkage is a serious and a massive problem. Effective retrieval alone, disregarding dissemination, is becoming a problem with which individual universities and companies can no longer cope. Add to this the dissemination needs, including packaging, conveyor and consultant services, and effective opinion leadership, and we are then talking about a multi-billion dollar enterprise involving the coordinated efforts of tens of thousands of skilled professionals. This is what is represented to a degree in the Agricultural Extension Service. We have no equivalent in any other field.

It is difficult to envisage a coordinated system of linkage without heavy government involvement, either by itself, or in partnership with the university and private profit and non-profit organizations.

At the present time the government is dabbling in the extension-knowledge linking business in technology, medicine, and education, with rather mixed results. The technology information program undertaken by the National Aeronautics and Space Administration has been very well financed and elegantly organized, but so far, evaluation studies indicate that instances of genuine knowledge transfer resulting from this system are negligible (Arthur D. Little, Inc., 1965; Denver Research Institute, 1967; Wright, 1965). In medicine, the government has been less ambitious so far but the funds expended on such projects as the National Library of Medicine's automated information retrieval system (MEDLARS) have not been clearly justified.[28]

In education there has been considerable activity, particularly in institution building in the last three or four years. First came the R & D cen-

[28] Atwood (1964) notes that it is far too expensive and time consuming for even small scale *research* use. For very large research projects it appears to be useful. Apparently, the individual practitioner is not yet viewed as a possible user.

ters established with firm university bases, and perhaps suffering in effectiveness as linkers for that reason. Then came the ERIC centers, university-based and coordinated at the federal level, but so far equipped primarily to service the information needs only of researchers. Finally, we now have the Title III centers at the school system level, and the regional laboratories originally created as semi-autonomous research, training, and service centers to serve groups of states on a regional basis. In spite of this flowering of institutional structures and substructures, and in spite of planning and funding from one source, there is no explicit relationship among these various units. This would appear to be in contrast to the system in agriculture.

There may never be a day of reckoning for this government-supported non-system for development and diffusion in education, especially when we are still struggling for satisfactory criteria for success in this area. Nevertheless, some comments are in order on how it will affect the evolution of linking roles. First of all, it doesn't seem possible in light of our experience in agriculture and elsewhere that linking roles could be established in education without heavy federal support. David Clark's comment that "... the total cost of such an educational extension service would not be great" (1962, p. 117) would appear to be questionable. The total cost of the AES *and* the subsidies to the associated land grant colleges over the last 100 years would be hard to compute in today's dollars, but it is undoubtedly on the order of several billions.

Secondly, it would seem advisable for the government to involve itself *directly* as well as indirectly in the diffusion process. County agents and extension specialists are government employees. While this is disadvantageous in some respects, it does provide a unique home base and an independence from university and commercial requirements. The farmer looks on the county agent as a reasonably objective information source. The same cannot be said for the detail man, the publisher, or the seed salesman.

One of the problems in installing government employees as linkage agents is the tendency for them to be used as and seen as *control agents* or policemen. Apparently the county agent has managed to avoid this image and it is possible for education's linkers to move away from such an image, also, as this observation by Featherstone on some reforms in the British primary schools indicates:

> Another element in the reform was a different emphasis in the work on the HMI's (government inspectors). As long as the inspectors acted as educational policemen, making the schools toe the mark, their effect over the years was to dampen innovation. But as their role took on more and

> more of an advisory character, they became important agents for disseminating new ideas. There is a clear moral here: external rules enforced from without not only have little positive effect on schools, but they tend to make their practices rigidify through fear. Where government and local inspectors have ceased inspecting and taken up advising, the results have been excellent. Some of the lively authorities, such as Leicestershire, set up distinct advisory offices, with no administrative responsibilities except to spread ideas and train teachers in new methods. (1967, p. 17)

Thirdly, the government should be specific in defining the roles it wishes to establish. This should be a matter of public policy. Thus far the various roles generated by different centers have been richly innovative but they hardly give a chance for the development of a professional identity and esprit de corps, which are essential to put a new role on a solid footing. Having allowed these various roles to flourish for a time, the government should decide what specific linking role or roles are best and devote its resources to the development of such roles, to the exclusion of others.

Commercial

Having said that government involvement is essential, we would now add that commercial involvement is probably essential also. Nowhere can one gain a greater appreciation for the mixed economy than through the study of processes of dissemination and utilization. In agriculture, the county agent, the farm magazines, commercial agents, and other farmers all seem to play complementary and important roles in the ultimate adoption of new ideas, products, and practices.[29]

Both the strengths and the weaknesses of the commercially based linker are related to his special motivation. On the positive side, unlike other linkers, he has a real stake, a direct survival stake, in adoption. While this may infuse him with greater zeal it also stands in his way because the client generally does not give him high credibility for this reason. Beal and Rogers (1958), for example, found that farmers were generally suspicious of the motives of the commercial agent, and even innovators did not use him as a short cut to new ideas. The dangers of doing so are illustrated in the story of the grass-incubator, a useless "innovation" pushed by some dealers. Farmers who were in good touch with the county extension service as well as commercial agents were not taken in (Francis and Rogers, 1960; Francis, 1960). Hence they successively utilized the more truly scientific counter-knowledge of the AES. In contrast, adopters

[29] Abell (1957) cites her own work and 13 other works to illustrate this fact. Research by Lionberger (1954) and Wilkening (1956) testify to the same point.

of the incubator were found to be farmers who had great faith in the salesmen, relying on them for information which could have easily come from other sources.

When other expert sources are easily available within one's working environment the commercial agent is probably least influential. Burkholder (1963), for example, found that the drug detail man's offerings were scorned and ignored by physicians working within the context of a large teaching hospital.

Increasingly in recent years the government has taken to contracting out much of the research and development work that it needs for space and military programs.[30] This has been used in part to circumvent bureaucratic roadblocks such as fixed salary schedules. There are some signs that in education, too, the government is beginning to move in this direction. There is no question that private enterprise should be heavily involved in diffusion to our educational system. It would appear from the above findings that the government would be ill-advised to leave the field entirely, however.

Practice institutions as bases for linkers

Should the linking agent be especially supported by the individual hospital? school system? business organization? Such a proposition is attractive in some respects and is actively endorsed by a number of authors. Anderson (1961) argues that his "educational engineer" must be hired by, and be responsible to, the local school system. The "Research Implementation Teams" now being developed by Research for Better Schools, Inc. (a regional lab) are founded on the same philosophy (Research for Better Schools, Inc., 1967).

The advantages of such an arrangement would appear to be related primarily to the concept of "insideness." The linker is right there at the locus of need. He understands the client system in all its uniqueness.

On the other hand, there are many tough problems associated with this arrangement. One is recruitment; how do we attract people with the requisite skills to work on such a local and presumably lowly level? Another is access to resources; from such a base how does the linker keep himself in touch with new developments? How does he stay linked to the resource system? Finally, how does he gain acceptance in the local system? We cannot assume that, having a local practice base, the linker will be seen as a legitimate source. We cannot create instant opinion leadership, and we cannot prevent this inside linker from being viewed sometimes as an interloper, a policeman, or a busybody.

[30] See Marx (1965) and Lindveit (1960) for analysis of this trend.

Independent linkers

There are probably innumerable bona fide knowledge linkers in our society who do not go under any official title as linkers. The informal role of opinion leader is a case in point.

Although there is a place for independent and free lance linkers, there are major limitations. First of all, they cannot serve as linkers on a full time basis. Secondly, their efforts are likely to be sporadic and their influence haphazard. Thirdly, they cannot be relied upon to provide training, special skills, and equipment and supplies which are often the necessary accompaniments of innovations.

Nevertheless, there are some outstanding cases in which free lancers have played a major role. B. R. Clark (1965) notes a pattern of "... private committees serving as connectors between public authorities, notably between federal agencies, and local authorities in the curriculum reform movement." He goes on to cite the Physical Science Study Committee as an example.

As *inventors* of new products and practices free lancers play a surprisingly important part even in technical areas (Jewkes et al., 1958; Nader, 1967). In one study (Jewkes et al., 1958) it was found that 33 of 61 inventions, when traced to their source, turned out to originate with independents. When it comes to diffusion, however, it seems doubtful that individuals working alone without legitimation and without financial and organizational support can play a major role.

To summarize this discussion, there appear to be four principal institutional bases for the linker: university, government, commercial, and practice. University and practice bases may be facilitative in gaining entry to the resource system and the practice system respectively but there is little evidence that outsiders are less effective or less influential than marginal insiders. Both government and commercial linkers were seen as operating very effectively from the outside and in complementary ways. A well-functioning knowledge diffusion and utilization network includes government and commercial channels. However, when one is used without the other, distortions and imbalances which affect the process adversely are likely to result.

Linking institutions

From the broader question of institutional parentage or base we now move more specifically to a consideration of the types of institutions which could in themselves be called "linking institutions." Throughout this paper the linker has been viewed as an individual person and when

we have talked of several linking functions we have seen them as roles which acted in complementary ways to help build a knowledge linking chain or system.[31] We also noted how these ideal role types defined by function could be combined in one actual linker, the county agent being a prime example of this. At this point, however, it should be recognized that a number of individuals serving complementary linking functions can combine organizationally to serve as one unit. Thus the extension subject matter specialist and the county agent both belong to one institution, the Agricultural Extension Service, which as a whole is the knowledge linker between the university and the farm family.

It has not been deemed appropriate in this paper to discuss the many institutional arrangements, actual and possible, which serve as knowledge linkers. This would be the topic of another paper. All that should be noted here is the range of possible structures and the implications of various types of structures for the individual linker.

Overriding other aspects of a typology of institutions is the distinction between permanent and temporary organizational units.[32] Institutions of the permanent type include such entities as "centers," "institutions," "laboratories," "companies," and "associations," while those of the temporary type include such entities as "projects," "programs," "committees," "courses," "conferences," and "conventions." The effective installation and manipulation of both these types of institutions play a major part in insuring the viability and the effectiveness of the individual linking agent.

Permanent linking institutions

Permanent linking institutions provide three important possibilities for the individual linker: (1) security, (2) identity, and (3) coordination. *Security* means a home base and a degree of independence from both the practice world and the university research world demands and dependencies. These seem to be basics of survival for any role in a social system. A chronic problem is the perception of the linker as an adjunct, not a necessary part of either research or practice. This means that inclusion of linkers in these other institutional homes would perpetuate insecurity.

Identity comes from the awareness by the linker, himself, and by those with whom he deals that he is somebody: somebody who does something not only valuable but clearly distinguishable from what other people do. In some degree, identity is something each individual has to achieve by himself through his own labors, but in face-to-face interactions with

[31] See again FIGURE 3.

[32] This distinction is most fully developed and utilized by Miles (1964).

others, role holders depend heavily upon the generalized impression or "image" that their own role has attained. This is an especially severe problem when we are attempting to introduce *new roles* and when we are attempting to introduce roles which overlap and interconnect with well established existing roles such as "researchers" and "practitioners." How the linker is judged and how well he is welcomed will depend greatly on the image of the organization of which he is seen to be a part.

Coordination serves what might be called the rational function of organizations: through division of labor, to accomplish as a group what the individual alone cannot accomplish. In terms of linking roles, coordination means the capacity to fuse the many functions discussed earlier in this paper while allowing individuals to specialize in providing those functions with which they are most skilled. Some can concentrate on the task of retrieval of knowledge from research, some on translating and packaging this knowledge, some on conveying it to clients. Still others can specialize in consultation, helping clients diagnose needs, helping them adapt, building openness, providing reinforcement, and so forth. If it were possible for all these functions to be performed by one person, or through one role, which is highly unlikely, certainly, they could not be done well.

Unfortunately, coordination works better in theory than in practice. As noted earlier in the discussion of leadership in the R & D laboratory, there is a constant tug of war between independent basic research and application concerns, between science and management within the industrial laboratory. Conflicts of the same order might well arise in linking institutions, let us say between those who believe the conveyor role is paramount and those who believe the consultant role is paramount. In settings where there are no external pressures to produce, for example in *university* applied research centers in contrast to *industrial* R & D centers, the manager is likely to escape from such conflicts by letting each man or each sub-group go his own way. It would be unfortunate if the directors of linking institutions took this completely laissez-faire attitude. Coordination is difficult to achieve but it is a prize worth the struggle. When a manager evades his responsibility in this area his organization will fall far short of its potential.

Temporary systems

With the advantages of the permanent institution's security, identity, and coordination, go corresponding disadvantages of isolation, self-satisfaction, and rigidity. These would be fatal shortcomings for any organization trying to be a linker. It is largely through organizing into temporary

systems, that linking institutions avoid these pitfalls and maintain their vitality.

The actual work of linkage is not a continuous routine process. It simply doesn't work that way. Even the conveyor is not a conveyor belt. The work of a county agent, for example, is structured around programs, special projects, campaigns, etc. (Penders, 1963; Stone, 1952), as is the work of the Extension Subject Matter Specialist (Brown and Deekens, 1958), and as is the work of the cross-cultural development worker (Holmberg, 1960; Schmitt, 1964). It is important for the motivation of the linker that he may see his work in time-limited segments which follow a meaningful sequence from initiation to completion. These time-limited sequences or projects are one form of temporary system.

The temporary system is also important in being the vehicle through which interaction and exchange with clients and researchers is carried on. The training *course*, the *conference*, and the *convention* are traditional types of temporary systems in which knowledge linkage of a sort takes place. Most recently, however, many new models of temporary systems for linking to new knowledge are taking shape. Human relations training laboratories (Bradford, et al., 1964), "grid" management training programs (Blake and Mouton, 1964), organizational survey and survey feedback projects (Mann and Neff, 1961), traveling seminars (e.g., Richland, 1965), and collaborative action-inquiry projects (Thelen, 1967), represent a few of the unique temporary systems which have evolved in the last decade to bring the linking agent (often called "trainer," "consultant," or "change agent") together with the client in a meaningful sequence of steps designed to help the client by making him more expert, more open to new ideas, and more adaptive.

Another type of temporary system, this time bringing researchers (at least social researchers) more into the picture, is the *action research* project. Here the program or change activity is *experimental* and the researcher's involvement, at least initially, is restricted to evaluation and creating instruments and a design which allow for evaluation. As a method for linking researchers to practice this model of action research has some problems, however. Relations between the *research* and *action* roles can be stormy and there is always resistance on the part of the researcher to "getting his hands dirty" with application and utilization activities. Schmuck's paper in this volume sheds considerable light on various aspects of this barrier problem between social scientists and practitioners in education.

It has been suggested by Jacobson (1962, himself citing Palmer Johnson) that very large scale experimentation in education, whatever its

value scientifically, is an effective means of disseminating new knowledge. The more people who take part and the more disciplines and different knowledge sources they represent, the better the chance for cross-fertilization and new learnings by all and the better the chances of publicity and hence diffusion to non-participants. The same type of research is criticized by Blackwell (1955) who believes that enforced "togetherness" restricts productivity and creativity, reducing everything to the lowest common denominator. Massive inter-university inter-disciplinary research action projects such as the Cooperative Project for Educational Development (COPED), when they are evaluated, should answer such questions for us.

There are other temporary systems which do involve the researcher *directly* in a collaborative knowledge retrieval and application activity with linkers and practitioners. At the highest level we have seen this in the Physical Science Study Committee.[33] There is yet another model, however, which seeks to involve not only researchers and linkers, but also policy makers, administrators and practitioners ("direct workers") in a sequential activity of problem diagnosis, research retrieval, derivation of implications and future action planning. This is the "derivation conference" now being pioneered by Jung and Lippitt (Jung, 1966).

It has not been our intent to dwell on these various temporary institutional forms in any great depth, but this brief summary should give an indication of the many tools which the linker potentially has at his disposal. A permanent linking institution should have a capability of generating a great variety of temporary systems to suit specific occasions, clients, and topics, for it is largely through the overlapping group memberships and collaborative activities of these temporary systems that linkage between resources and user can be achieved. FIGURE 4 is intended to be a schematic representation of this pattern of inter-institutional linkage.

Endemic Problems in Linking Roles: A Summary

Throughout this paper we have seen certain issues which seem to keep coming up again and again, problematic aspects in the linker role which run as themes through the discussion of function, coordination, institutional context and so forth. These problems were suggested in TABLE 2 where a comparison of conveyor and consultant linkers was presented, but they can probably be summarized under just two headings: *overload* and *marginality*.

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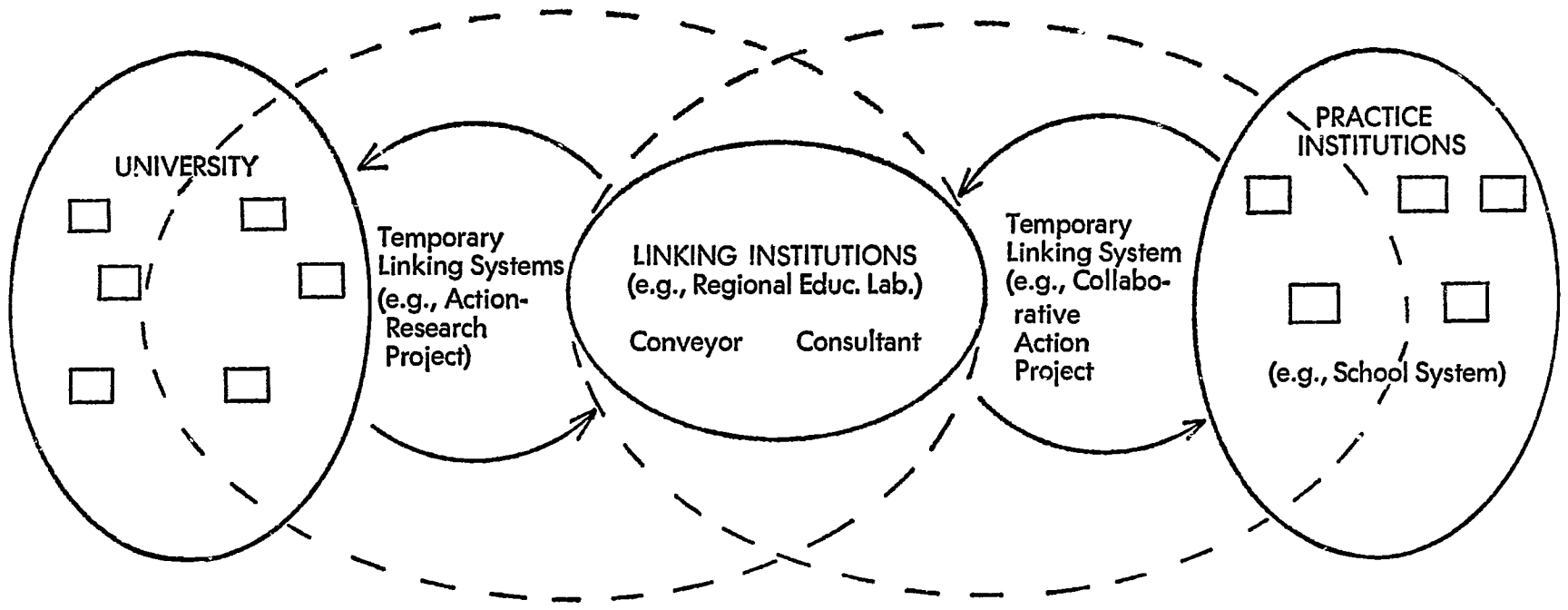
[33] It was perhaps the most successful knowledge utilization project of all times in education, although this could not all be attributed to its structure. Within five years, 50% of the schools in the U.S. had adopted it, an extraordinary record (Clark, 1965).

Figure 4

LINKING INSTITUTIONS: SEPARATENESS AND TOGETHERNESS



Solid lines represent **permanent** systems
Dotted lines represent **temporary** systems

Overload

The linker's activities can be grouped into three kinds of processes: getting information (*input*), processing information (*thru-put*), and distributing information to others (*output*). In each of these processes the linker may have *too much to do*. He may have too much information to handle, too many people to get it from, too many steps to put it through, and too many people to give it to. In TABLE 3, the various problems related to overload are summarized.

Table 3

OVERLOAD PROBLEMS FOR THE LINKER

	NUMBER	COMPLEXITY	DIFFICULTY
Input	Information has to be assembled from too many sources.	Sources are highly technical, requiring high degrees of scientific competence.	Information is inaccessible.
Thru-put	Too many pieces of information need to be assembled.	Information has to be taken from a highly technical form to a highly simplified and packaged form.	The forms into which the knowledge must be assembled require a great expenditure of effort (e.g., construction of a complete training course).
Output	Information has to be distributed to too many people.	Information which is complex and difficult to understand must be communicated to the user.	Users are very hard to reach and to influence.

If TABLE 3 shows anything it shows us the magnitude of the job of the linker. It highlights the need for a drastic division of labor and a clear definition of sub-function, which can only be accomplished through institutionalization. It also highlights the need for the linker to focus his activities in projects, time-limited and objective-limited sequences.

With all these potential overload problems and a job to be done, one might ask: How can it be done, and how is it done now? The answer is: "not too well!" When we can't do something right we muddle through; we cut corners; and we do "something" even if the something doesn't work, isn't useful, even if it raises expectations which can't be met or casts the client adrift.

What compounds the problem is our human tendencies: (a) to avoid defeats and failures by thinking of them as victories; (b) to disguise the inadequacies of our knowledge by saying that there is nothing more out there worth knowing and (c) to hide the inadequacy of our range of

skills by saying that what we know how to do is the only important thing which needs to be done.

These human tendencies to hide or paper over limitations have serious effects in producing divisiveness among linkers with different skill mixes and knowledge bases. The learning people disparage the human relations trainers who disparage the survey researchers and so forth. Thus, people who should be getting together go separate ways, forming their own competing models of "*the*" change process, and their own institutions, and programs for linking. The practitioner's reaction is often the justified cry of "a plague on all your houses."

Marginality

The second problem theme which seems to be present whenever we discuss knowledge linking roles is "marginality." Marginality may well be inherent in the linking role for strategic reasons. The linker is necessarily and by definition an in-betweener. He takes from the research world but he is not clearly a part of that world, and he gives to the practice world while not being clearly a part of that world either. He can attain partial membership in either the practice or research world by overlapping memberships while not achieving full membership; these associations only partly legitimate his presence.

This marginality is not entirely in the nature of things, however. The linker may be fortunate in belonging to an *independent linking institution*, with a long and distinguished record and a good image. If he is, his structural marginality, his outsideness, will be more an asset than a hindrance.

Another element which often causes the marginality is *recency*. Any role is marginal when it is first created and developed. Thus, in education where the knowledge linking role is only now emerging, we may expect more difficulties related to marginality than we find, let us say, in agriculture where the county agent is so well-established. As we all know, anyone who has a new job is marginal to the organization, and if the job itself is newly created it is just that much more of a problem. It is compounded by suspicion by various persons and groups who feel infringed upon (role-conflict) and others who are in the "same" roles as we are but seem to be behaving very differently (role-consensus).[34]

[34] For a more adequate definition and discussion of the problem of marginality in organizations and how it affects the role holder see Kahn et. al. (1964). The classic study in role analysis is, of course, that of Gross, et. al. (1958), of the school superintendent. Additional empirical studies of that calibre and that depth are now needed to evaluate the role of knowledge linker.

These are some of the causes of marginality,[35] but what about its effects? Here we must confront the basic fact of viability. Marginality of the role means stress for the role holder. Put this together with the stress which results from overload and we have a completely untenable position. Nobody will get in it and nobody will stay in it. The social engineers who are designing linking roles will have to find ways to reduce either marginality or its ill effects.

Implications for Education

We come at last to the implications of this analysis for education and for those who would foster the development of linking roles in education. Our prescription revolves primarily around solutions to the two big problem themes: overload and marginality. Looking at this from the point of view of planning and administration, there are four things that have to be done to build a functioning system of knowledge linkers: (1) We need to build an *institution* which includes and supports the required roles; (2) We need to *recruit* candidates to serve in these roles; (3) We need to *train* these recruits to fill the roles; and (4) Finally; we need to *supply* them with the equipment necessary to help them do a good job. We will discuss these four requirements under the headings: installation, recruitment, training, and equipping.

Installation

We need to build a secure base for the linker, a permanent institution which includes a mix of interdependent complementary linking roles, especially those described earlier under "conveyor" and "consultant." We must make certain not only that these roles are included but also that they are coordinated by a director who appreciates the need and importance of each role and is motivated to work hard at bringing them together.

This linking institution could be based in a university or a school system, but neither of these alternatives is entirely satisfactory. An independent base not identified with either the research world or the practice world is probably preferable. In any case the institution will be expensive to operate if it is to be an effective linker and will, therefore, require federal support either directly or indirectly through contracts and grants

[35] In a previous paper (Havelock, 1967) the author suggested that *transiency* was also a problem, i.e., the possibility that one's role would become obsolete as the user's sophistication approached that of the linker. Further review of the literature does not yield any information to indicate that this by-passing phenomenon is a real problem. There always seems to be plenty of useful work for the linker still to do, even after his most sophisticated clients have learned to do without him.

to universities, school systems, *and* commercial firms. The part played by the federal government should not end with financing, however. There is a more definitive, directive, and coordinative function which the government should not avoid. Eventually in the not too distant future, the government should come up with an overall plan for an educational extension service which includes well-defined linking roles at various levels. Furthermore, it should not shy away from coordination of state and regional services to reduce redundancy of effort and to insure that knowledge packages and programs developed in one area are *effectively* diffused throughout the national extension system.[36]

Recruiting

The question of how we can fill the need for a large number of linking agents in the next decade is of concern to many educators (Hopkins, 1967), but we feel that there are ways of filling this gap. In part, we are inclined to go along with Pellegrin's observation (Pellegrin, 1967) that the roles get filled if the money is there, but in any case there are still many manpower resources which could be tapped for this role if it were adequately institutionalized. First of all, it should be an attractive role for the young teacher or teacher-in-training who wants a little more challenge and variety than he is likely to get in a routine teaching assignment. Secondly, there is the large reserve of female talent in this country which is becoming partially liberated from the housewife role. Finally, we should not forget the retired teacher who might be an exceptionally valuable change agent in *working with older and more experienced client teachers.*

If the need is for people with top-flight research backgrounds and credentials, then the recruitment picture is dim if not hopeless. However, the need for highly educated people will not be great if we can provide talented candidates with training to make them proficient as knowledge retrievers and research assistants.

Training

This brings us to the third task: training for the linking agent. We need to develop a new curriculum in our schools of education specifically designed to develop linking agents. We see at least four elements that would have to go into such a curriculum: (a) an understanding of the knowledge dissemination and utilization process as a whole, including some

[36] Duplication of effort is probably one of the most wasteful aspects of our national effort in agriculture, divided as it is into 50 separate research-development-diffusion systems.

awareness of various models of planned change, empirical studies which have been done, and research methods for studying it; (b) an understanding of how to work with client systems, including strategies for collaboration, help on diagnosing needs, and help in self-evaluation of effort; (c) an understanding of the resource system, including an appreciation for research values, concerns and methods, and a review of knowledge storage and retrieval methods and tools; and (d) an appreciation of the need for role-complementarity and coordination in the fulfillment of dissemination objectives.[37]

Equipping

Lastly we come to the important matter of equipment. It is not enough to train a man and send him out into the field. We must give him tools with which to work, and if we don't have these tools now, we should get busy and develop them. Again here we find that experience in agriculture and other fields points up the importance of putting well-designed, well-prepared working materials in the hands of the linker. At least six types of tools need to be developed for his use: (1) He needs to have at his disposal a range of linking strategies or project designs for work with various clients under various circumstances so he can build the most suitable temporary systems for the task at hand; (2) If he is in a conveyor role, he should be provided with a handbook of new practices, innovations, and usable research knowledge equivalent to the loose-leaf handbook which is the basic stand-by of the county agent; (3) Especially if he is a consultant but even if a conveyor, he should have a handbook on linking problems and solutions, possibly accompanied by a checklist of problems to look for in utilization activities; (4) He would be helped by having a guide to the retrieval of knowledge in his particular area so that he could have access to knowledge beyond that contained in the handbook; (5) He needs to have at his disposal simple instruments to measure the success of his dissemination and utilization efforts (Such instruments, which might be in the form of checklists, questionnaires, or interview questions, would be invaluable in giving him feedback so that he can change his behavior and improve his performance as a linker); (6) Particularly if he is a consultant he needs to have client self-diagnostic tools, again including checklists, formats for making force-field analyses, and self-administered questionnaires.

Any or all of these tools will be important in building a sense of security and competence in the linker and in reducing his overload.

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[37] Lippitt, et al, (1958) provide a number of useful suggestions on the possible content of a "curriculum for training change agents."

There may yet be a nagging question to some educators on these proposals for the development of linking roles, a question which is raised again and again at educational research meetings. It is: "Do we have any knowledge worth disseminating?" We think that the answer should be an emphatic "yes." We have knowledge in the form of programmed instruction, driver training films, computers, texts in innumerable formats covering innumerable topics in innumerable ways, films, video-tape recorders, classroom feedback exercises, and so on.

The trouble is that this "knowledge" in most cases is untested, unevaluated. Its status as "scientific" knowledge is questionable, or its status as useful knowledge is questionable, or both. Broadly what we need to do is to upgrade our store of knowledge in education through translating it, evaluating it, trying it out, and re-evaluating it. Our educational researchers must be involved in this process and a significant number of our educators and educational administrators and practitioners must be involved in it, too. This can be done through a coordinated extension and knowledge linking system.

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CHAPTER
5

Sam D. Sieber

Organizational Influences on Innovative Roles

The paucity of research in the field of education diffusion and innovation renders anything we might say on the subject highly speculative. It is true that a large literature on diffusion exists in scientific and technical fields, such as agriculture, medicine, the behavioral sciences and industry (Paisley, 1965; Rogers, 1962). But the findings of these fields have limited application to education, for reasons that we shall presently discuss. Further, the studies conducted under the inspiration of Mort at Teachers College (Ross, 1958), comprising the bulk of diffusion research on education, tell us little about specific processes of innovation and hindrances to change. And there are indications that even the findings about *diffusion rates* that were produced by this tradition have been outdated by recent acceleration in the production and distribution of educational ideas. Such factors as the Cold War and the National Defense Education Act, the explosion of knowledge and expansion of the knowledge industry, community pressures for greater efficiency in education fostered by the baby boom, building shortages and higher tax rates, and changing occupational patterns have created great ferment in education

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(Miller, 1967). These trends have pressed for faster adoption of new ideas and practices, and the new R & D structures have provided facilitative mechanisms (Sieber, 1967). Under the circumstances, it seems likely that the historical lag between invention and adoption has been substantially reduced.

Several authorities have even claimed that a new problem has emerged in many schools—the problem of *too hasty* adoption. Grobman, a participant in the Biological Sciences Curriculum Study, has stated:

> . . . some of the curriculum ideas have had more of an impact than I would have liked to see, since I think there has been over-hasty adoption in a "bandwagon" or desperation attitude of many curriculum innovations, in contrast to the generation it has taken to bring about change in the past. At the moment, it seems to me quite clear that innovation is having an impact, and the pressing problem is how do we direct the impact and how do we assess it? (Wiles, 1965, p. 2).

The chaotic character of educational change today has been abetted by crisis-oriented legislation at local and federal levels. Despite the fact that most professional educators, owing to their own crisis-orientation, warmly endorse this trend, the outcome is a myriad of educational fads whose sole virtue is often political. The best ideas and practices are easily lost in the stampede.

And yet, who is carrying out research on the causes and effects of over-diffusion and of uncritical adoption, or on the best means of "directing the impact" on a national scale? Or, for that matter, who is even attempting to describe the national network of diffusion in a systematic, empirical fashion. The strategy and findings of Mort's research seem oddly irrelevant in our new era of educational change. One would prefer to ask the professors who recommended the "best practices" that were included in Mort's Adaptability Scale how they arrived at their judgments, rather than to appraise the up-to-dateness of an educational program by the number of such innovations claimed by the school. In these times, the latter strategy might be better suited to appraising the amount of *faddism* in many schools.

Inasmuch as the research on educational diffusion and development has fallen behind the times, the best that can be done at this stage is to offer a set of perspectives based on heuristic assumptions of fact in the pious hope of stimulating research.

Distinctive Features of the Educational System as Starting Points for Research[1]

There are four aspects of our public educational system that ought to be given more attention in seeking to understand processes and outcomes of change and which, when taken together, distinguish education from the social systems of medical practice, industry, and agriculture. Because of these distinctions, the applicability of diffusion research in these fields to educational structures is severely limited. These aspects are the following: vulnerability to the social environment; the professional self-image and associated values of educational personnel; the diffuseness of educational goals; and the need for coordination and control of the primary clientele as well as of the employees of the system. We view education, then, as a *vulnerable formal organization with diffuse goals, whose functionnaries are quasi-professionals, and which is devoted to processing people within its boundaries.* The implications of these features for diffusion and innovation are tremendous, but seem to be scarcely recognized by either researchers or practitioners.

In the discussion that follows, I will first indicate how these aspects of the system affect innovation, then note the inadequacy of current strategies of change which overlook these features. Finally, I will briefly suggest how these same aspects might be exploited by means of an alternative strategy.

Vulnerability

The vulnerability of an organization refers to the extent to which the organization is subject to powerful influences stemming from its environment irrespective of the goals and resources of the organization. A formal definition of vulnerability, therefore, might be: *the probability of being subjected to pressures that are incompatible with one's goals without the capacity to resist.* If external pressures were wholly compatible with the goals of the system, and resources were adequate to attain these goals, the system would be in perfect harmony with its environment. Vulnerability, in the sense of exposure to untoward influence, would not be an issue. A high degree of vulnerability, therefore, can be detected in three characteristics of the organization: (1) subjugation to the environment, (2) dis-

[1] We owe a greater debt to three writers on this subject than can be signified in specific references in footnotes. They are: Bidwell, 1965; Miles, 1965; and Wayland, 1964, 1967. We are also indebted to the participants in the UCEA Seminar, in a faculty seminar on educational systems, Columbia University, and in a graduate training seminar, Columbia University, for helpful comments on an earlier version of the paper.

crepancy between the demands of the environment and the goals of the organization, and (3) inadequate resources for achievement of organizational goals. Since "subjugation to the environment" is obvious in the case of American educational organizations, at least with regard to nominal-legal control, we will pay more attention here to the other two conditions of vulnerability.

Owing to periodic maladjustments between external demands and organizational outcomes, most organizations are occasionally subject to environmental pressures that conflict with organizational goals. The educational system, however, is especially prone to such maladjustments. This tendency arises from trying to fulfill the distinctive functions of education in a rapidly changing social order—the functions of socializing and training recruits in fundamental ways, and of allocating them to adult roles. The socialization-training function is made problematic by the accelerated expansion of knowledge and skills required by the society and by major shifts in value systems, which trends produce a recurring lag between the output of the educational enterprise and the *potential*, available inputs (new knowledge, skills, and values). The fulfillment of the allocation function is frustrated by changes in occupational patterns, and by increasing urbanization and leisure time. For these reasons, transformations in both the structure of adult roles, and in the knowledge and skills required to fill both old and new roles, place great strain on the educational system. It is small wonder, then, that education is frequently accused of "falling behind the times."

Evidence of goal-conflict between school and community is afforded by a recent study conducted by the Bureau of Applied Social Research. This study shows that most parents do not share the educational goals of their children's teachers. In a study of mothers from all types of backgrounds and communities, it was found that 56 percent espoused a goal for the local school that was different from the goal expressed by the teacher of their children.[2]

The ability of an organization to mobilize resources for the attainment of its goals also affects vulnerability. For without the needed resources, the organization loses the initiative for directed change in conformity with its objectives, and must rely more heavily upon conditional handouts from the environment. (Ear-marked funds from the federal government typify what we have in mind when we refer to a *conditional handout.*) We therefore need to examine the *resource level* of the system in assessing its vulnerability.

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[2] From a forthcoming project report by David E. Wilder, *et al.*

The increasing democratization of education, reflected in desegregation, emphasis on comprehensive schools, and reduction in the high school drop-out rate, means that the system is obliged to deal with a growing percentage of the school age population from increasingly diversified backgrounds. Between 1947 and 1964, the proportion of 16 and 17 year olds who were enrolled in public schools jumped from 68 percent to 88 percent (U.S. Dept. of HEW, 1965). Add to this trend the large-scale shifts in population and the continued reliance upon an outmoded financial structure (Conant, 1967), and it becomes apparent that the educational system is suffering from internal problems of mobilizing resources at the same time that it is confronted with urgent new demands from society at large. Moreover, because education is both highly bureaucratized and decentralized, it is difficult to adjust the machinery to new demands fast enough to satisfy their proponents. Education of the disadvantaged has been a national theme for several years, for example, but there are still virtually no teacher training institutions with special programs for teachers who plan to work in lower class neighborhoods.

The consequences of vulnerability to local pressures should not be overstated because school personnel are sometimes adept in manipulating public opinion and in evading scrutiny, and the parents' anticipation of being "cooled out" may often discourage them from complaining. But local publics are not the only sources of pressure and influence. Wayland (1964) has stressed the existence of a national system of agencies concerned with education, or ancillary structures, that frequently dominate decisions at the local level. Teacher training institutions, professional associations, accreditation associations, examination systems, textbook publishers, federal and state agencies, and by no means least, colleges and technical schools which set requirements are all members of a national network of communication and power, and their influence reaches into every local district. In most communities this national system reduces local formal control of education to a mere shadow of its ideological intent.

In sum, the gap between social demands and the activities and outputs of the system is substantial, and it has been enlarged in recent years due to several factors. Consequently, the goals and accomplishments of the educational system have failed to gibe with the expectations held by powerful sectors of the environment, and these sectors have therefore redoubled their efforts to dictate school practices, or at the very least to press the schools to display tokens of progress. The end result is that schools have found it increasingly difficult to seize the initiative for innovation.

The vulnerability of school systems holds several specific implications for innovation. First, changes in practice that run the risk of disturbing the local community are eschewed. This response is quite evident in the instance of school board members. Gallup (1966) asked a national sample of school board trustees to estimate how much difficulty would be entailed in introducing 13 selected practices into their schools. The four practices most often regarded as "very difficult" were innovations that threatened the values or life styles of the community: (1) the use of pass or fail grades to reduce classroom competition, a practice which would run counter to the ideology of competition as a mainspring of effort, would make it difficult for graduates to get into college, and would fail to inform parents of their children's progress; (2) the reduction of summer vacation to four weeks, which would interfere with the vacationing habits of parents; (3) a nationally standardized high school test for seniors, which would raise the spectre of formal, national control over local standards and practices; and (4) an extension of the school day by one hour, which would be costly and would reduce the amount of time available for extra-curricular activities, especially athletics. The wisdom of imputing fear of community reactions to the board members is borne out by the fact that these four innovations were precisely those most often considered "a poor idea" by the parents in the same communities as the board members in Gallup's survey.

A second consequence of vulnerability is that innovations are adopted which are promoted by local publics. Indeed, political feasibility often carries greater weight than does educational value in determining the adoption of certain innovations. The new practices imported into schools tend to be non-disruptive, or watered-down versions of major innovations, or outright services to the community.[3] The strategy of adopting such practices has the effect of neutralizing elements in the community that favor radical change by offering tokens of progress.

Further, innovations that are persuasively publicized across the nation become candidates for adoption, regardless of their educational significance. Wiles (1965) cites the example of new mathematics programs:

> The power of the mass media in this respect was illustrated last year (1963) by the demand placed on school boards and school personnel for new mathematics programs after *Look* magazine had carried a feature story on the new mathematics.

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[3] Evidence of the differential response to a practice that *threatens* the community versus a practice that *serves* the community is afforded by Allen. Comparison of the diffusion rates of driver training (a service) with the idea of pupils studying the community (a threat) showed that driver training was adopted by 90 percent of the

The phenomenal increase in enrollment in new mathematics courses after Sputnik (an increase of 595% between 1948-49 and 1962-63) was widely sustained by public opinion.

Although we might be inclined to applaud the adoption of the new mathematics, the same pressures apply to an range of more controversial practices; and in the climate of educational criticism that prevails today, it is not uncommon for practices to be urged upon the school irrespective of the needs of the district. Illustrative of irrelevant pressures for innovation are the results of a content analysis of the published platforms of ten candidates for a school board in a relatively well-educated suburban district (Kerr, 1964). Out of a total of 15 specific education practices recommended by the candidates (omitting financial matters) 12 were already in operation in the system. Moreover, the candidates failed to mention a host of innovations that the schools had not adopted. These omissions, and the irrelevance of the stated recommendations, suggest that the candidates' ideas were gleaned randomly from popular literature. The irrelevance of the candidates' recommendations was by no means apparent to the voting public, who seemed to be only a little worse informed about the schools than the candidates.

When publicity for an innovation is translated into legislation, questionable practices may be locked into school systems for several years with little hope for honest assessment. Thus, Cronbach has pointed out:

> There is no evidence to justify . . . the California legislation that requires instruction in foreign language in grades six to eight; the assumptions used to justify the requirements are untested and, with the law now a fait accompli, no one is about to test them. The energies of the people who might be giving thoughtful attention to language instruction are diverted into a crash program to write curriculum materials and train teachers (Cronbach, 1966, p. 7).

The vulnerability of the system might also affect *internal relationships* in a fashion that reduces serious educational experimentation. An organization that is subject to control by a local constituency, and whose activities are potentially visible (by virtue of the fact that its clientele move in and out of the system every day), requires a high degree of consensus on goals and procedures in order to present a united front. Lacking such consensus, the organization's leaders must insist on a certain measure of secrecy. These conditions might promote dominative relationships between administrators and teachers, and also strong in-

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schools in 18 years, while community-study required 60 years to reach this level of adoption. (Allen, 1956; cited in Rogers, 1962, p. 41).

formal control among teachers, that might tend to countervail the exercise of professional discretion. Thus, radical departures from typical classroom practices are subtly discouraged lest parents make invidious comparisons with other staff members. The same kind of restraint probably acts upon principals and, perhaps, even upon higher administrative personnel.[4] In short, caution may be generated within the school apart from anticipation of either support or condemnation by the community. Efforts that are exerted beyond the call of duty by an individual practitioner might be viewed with apprehension because they threaten to raise community expectations for other staff members. Restriction of productivity on the part of industrial workers due to vulnerability to shifting standards of performance has been an object of study for almost 40 years. Presumably the assumption that teaching is a "profession" has prevented us from examining teachers in the same light.

Vulnerability to national ancillary structures also has its consequences for innovative roles. As serious as the problem of resistance to certain new practices undoubtedly is, from the standpoint of many schools an equally serious problem is *excessive* diffusion. Hearing as much as we do about the urgent need for dissemination of new ideas and practices, one would think that there were no professional journals, mass periodicals, newsletters, syllabi, in-service courses, consultants, accreditation teams, textbooks, curriculum committees, publishers' representatives, conferences, summer course work, or new teachers entering the system fresh from education courses. Many of our schools that are swamped with innovative ideas might consequently find it difficult to discriminate among them. Considerable disagreement among staff members regarding the allocation of resources to different innovations might be a further consequence. In many schools, excessive diffusion might produce a constant dither over the best means of keeping up to date, leading to the try-out of one fad after another. Finally, it would be interesting to know whether this climate of competing interests and information sources produces a debilitating ambivalence, or even cynicism, as is sometimes claimed; and further, whether these circumstances reinforce the importance of local political feasibility as an adoption criterion. The research on these questions remains to be done, but it is clear that the vulnerability of educational organizations is a factor that needs to be taken into account in planning for innovation.

[4] It seems clear, for example, that the resistance of school superintendents to national testing programs stems from apprehension over the public's penchant for invidious comparison among districts.

Quasi-professionalism

A second major aspect of educational systems is the self-image of professionalism held by school personnel. Members of occupations that are commonly regarded as "professions" are characterized by three features: (1) They perform a personal service that is regarded as indispensable in modern society; (2) They possess a high degree of technical competence; and (3) They enjoy considerable autonomy in their work. It cannot be denied that teachers are performing an indispensable personal service, but there is substantial doubt that they exhibit the remaining features of professionalism. With respect to autonomy, Brickell has described working conditions as follows:

> ... the teacher is not an independent professional, not a private entrepreneur free to alter his working situation when he chooses—not free to decide what he will teach to whom at what time and at what price. He is instead a member of the staff of a stable institution (Brickell, 1961, p. 19).

There are also certain attributes of the teaching force that distinguish the occupation from recognized professional groups. The overwhelming proportion are women; they are heavily recruited from the middle and lower-middle classes; the lower half of the ability continuum falls far below the average for other professions; only about half of secondary school teachers and one-quarter of elementary teachers have any training beyond college; salaries have failed to compete favorably with salary ranges in occupations requiring equivalent levels of preparation; teaching stands at the bottom of the professions in prestige; and occupational commitment is extremely low, as revealed by the fact that most teachers do not expect to remain in teaching until retirement, and only a small proportion of those who receive teacher training remain in the occupation longer than ten years (Jessup, 1967). For all these reasons, teaching is not a profession in the sense that we understand law and medicine to be professions. It appears, nevertheless, that teachers adopt the full-fledged professions as their reference groups. (This might be due to their identification with college professors and the upward mobility aspirations of lower middle class members.) The institutionalized gap between occupational reality and the aspirations of teachers is characteristic of "quasi-professions."[5]

In the first place, the quasi-professional status of teaching induces

[5] We prefer this term to the more common usage of "semi-profession" because the latter suggests an exact quantitative measurement, when in fact quasi-professions vary considerably in their approximation to full-fledged professions. Also, the adjective "quasi" contains a *subjective* element, in the sense of "resemblance" to full-fledged professions, that is missing in the term "semi."

apprehension toward actions that are designed to improve performance, because it is feared that such actions will increase the discrepancy between real status and level of aspiration. In effect, quasi-professionalism produces status-insecurity. Thus, innovations that are proposed by the administration are often resisted by teachers because they imply further restrictions on "professional" autonomy. Even expert consultants from outside the district are sometimes rejected because they threaten the teacher's insecure self-image as an "expert" in his own domain. Teachers, who are anxious to preserve the modicum of authority, expertise, and social standing that they possess, might reject administrative efforts despite the possibility of their better serving educational needs.

Similar treatment might be accorded the innovative ideas of laymen. The situation regarding laymen might be more stressful for teachers than for other quasi-professionals because of the vulnerability of the *organization*. Thus, because parents have legitimate control over the organization they do not hesitate to propose changes in the school. No doubt, teachers have developed a repertoire of "cooling out" techniques for dealing with laymen; by such means, worthwhile ideas for improving the instructional program might be rejected by teachers simply because they issue from laymen.

Status-insecurity in organizations has also been observed to cause "ritualism" or over-compliance with means to the neglect of ends. The teacher who dismisses his class for independent study, or who withholds a grade until a slow student has had a chance to master the material, or deviates widely from an approved lesson plan is risking a reprimand that he can ill afford in his insecure position. So teachers tend to over-comply with regulations, even when innovative behavior is nominally condoned, or when the educational goal is clearly better served by "irregular" behavior. Ritualism might undermine the purpose of a new, demonstrably worthwhile innovation since it is always possible to comply too rigidly with even the best procedures. If discretion is never exercised, it is doubtful that any classroom innovation will work effectively.

The insecure professional self-image of teachers might also account for a notable tendency among teachers to avoid informal communication on matters of teaching and learning. My own observation of faculty rooms over a period of a year suggests that informal discussion of classroom practices is minimal. Further evidence comes from a survey in which teachers were asked to nominate practices they knew about that might contribute to the mental health condition of pupils (Lippitt, 1965). Out of a total of 330 practices that were mentioned, only 30 were indicative of knowledge of what *other* teachers were doing—the over-

whelming majority were practices that the teachers themselves were following. The researcher concluded, "People usually do not know what other people are doing within their school buildings." Concealment by quasi-professionals of an inadequate base of knowledge and a limited set of skills might be necessary to permit them to preserve their professional identity. Such behavior might be especially appropriate when it becomes a matter of revealing classroom difficulties to other teachers. Advice might be least often sought, therefore, on precisely those problems that are most critical.

Still another possible consequence of status-insecurity is that energies which might be devoted to educational experimentation are channeled into *status-enhancement* activities, especially through participation in the local teachers' association or union. Corwin (1965) has shown that the more professionally-oriented teachers are more likely to exhibit militancy. My own field observations of the behavior of teachers during a period of incipient unionization demonstrates that instructional responsibilities are readily displaced by involvement in organizational protest.

The rejection of bureaucratic incentives for greater effort is another consequence of quasi-professionalism that bears on innovative roles. Professional self-esteem rests upon two bases: unstinting service to the individual needs of clients (which depends upon a large measure of privatized discretion), and recognition among colleagues. But formal incentive systems related to performance rest upon *observable* behavior, and *such incentive systems shift control from colleagues to administrators.* In other words, incentive systems violate two of the core values of professionalism. Thus, local merit plans are opposed as at once undermining collegial authority and violating the privileged nature of the professional-client relationship.

A final consequence of quasi-professionalism requires examination. Because the claim to professional status rests most securely on the *service-orientation* of teaching, this aspect of the teaching role might receive disproportionate emphasis, either because of selective recruitment of people-oriented individuals to the occupation, or because of compensation by those already in the occupation. Research tends to indicate that the teacher-pupil relationship is the most important source of occupational gratification for most teachers. Neither *expertise* (teaching skills and knowledge of subject-matter) nor *independence from supervision* can compete with *service to clients* as a source of satisfaction. One effect might be that teachers are "captured" by their clientele, especially through contacts in extra-curricular activities. Gordon (1957) has shown, for example, that contacts in extra-curricular activities make it easier for stu-

dents to manipulate the classroom behavior of teachers with respect to grading.

Further, since students are involuntary participants in the organization, emphasis on the affective-particularistic aspect of the relationship with students affords an alternative to technical expertise as a means of controlling and motivating students. And this emphasis also serves to legitimate the demand for greater discretion and autonomy. Because it is presumed that many students are unique and must be dealt with on their own terms, and that every classroom is different from every other classroom, it becomes bootless to suggest innovations that were developed for *other* students in *other classrooms*. In effect, the intimacy of the teacher-student relationship spurns the advice of outsiders. This state of affairs might explain the situation observed by Lippitt:

> We find in teachers a resistance or an inhibition to adopting another teacher's inventions. This is quite different, we find, from the active scouting for the newest in some of the other fields. Our interviews seem to suggest, for example, that the idea of adopting somebody else's practice somehow is a notion of imitation and that as such it is bad. (Lippitt, 1965, p. 13).

Goal-diffuseness

A great deal has been said about the difficulty of specifying the multiple, terminal goals of education and of measuring their attainment, especially the long-range socialization goals. *Goal-diffuseness* refers to this lack of clarity and focus among the goals of educational organizations. It arises from the wide array of constituencies that our comprehensive, compulsory system is obliged to serve.

The diffuseness of terminal goals reinforces the effects of *vulnerability* and of *status-insecurity* on the emergence of innovative roles. First, with regard to vulnerability—because it is difficult to adduce evidence for the effectiveness of an educational practice, it is often hard to oppose the naive demands of laymen, or to sell to the public innovations that are thought by educators to be of special value. Given the national norms of the profession with respect to innovation, and because problems of evaluation make it difficult to sort out the chaff from the grain, practitioners are vulnerable to the blandishments of educational hucksters. As a result, the problems of overdiffusion and uncritical adoption arise. Finally, the diffuseness of goals facilitates the *illusion of consensus* between school personnel and the public, which permits conflict to develop over the instrumental goals of the school and community. This points needs further clarification.

Instrumental goals, as contrasted with terminal goals, arise from a multitude of adjustments to problems that are confronted by the schools. Since the problems confronted by school personnel and those confronted by the public differ, their instrumental goals will tend to differ. For example, as mentioned earlier, many teachers find it expedient to emphasize the *nurturant* aspect of their relationship with students in order to preserve their professional identity, to motivate students individually, and to avoid a hardening of the anti-scholastic student subculture. According to a recent study of preferred teaching styles (which reflect instrumental goals), 62 percent of the teachers described themselves as pursuing a permissive, discovery-oriented style and 90 percent of the principals stated that they *preferred* this style (Sieber and Wilder, 1967). Note that this style may well involve a nurturant, affective relationship between teachers and students, thereby reflecting the instrumental goals of educators. But parents are evidently more concerned with the *substantive* and the *authoritarian* aspects of instruction. Only 30 percent of the mothers preferred the permissive, discovery-oriented style. A large minority of the working-class mothers (especially in the city) were concerned about classroom control, and large proportions of both working- and middle-class mothers were concerned about adequate coverage of subject matter and with regular testing of progress. These emphases reflect the instrumental goals of parents who are interested in instilling discipline and in preparing their children for college or for employment. Stated in terms of consensus between teachers and parents, it was found that children of more than two-thirds of the mothers had a teacher whose self-description was not in accord with the mothers' preferences for teaching styles.

Earlier we mentioned that 56 percent of the mothers disagreed with the *terminal* goals of the teacher. It seems, then, that there is a higher degree of consensus regarding terminal goals than instrumental goals. This might be a consequence of the lack of clarity in terminal goals, which permits verbal agreement despite fundamental differences in day-to-day outlook. Further, disagreement on terminal goals is less disturbing to parents than disagreement on instrumental goals. The mothers in our study were much more likely to be dissatisfied if they felt that the teacher was not complying with their expectations of classroom teaching styles (instrumental goals) than if they felt that the school did not share their long-run, educational goals (terminal goals).

If the terminal goals of education were more clear-cut, parents and educators could probably come to a better understanding of what is expected in the classroom. Under present circumstances of goal-diffuseness, however, potential conflict may build up over instrumental goals; and, as

mentioned earlier, goal conflict between an organization and its dominant environment is one of the distinguishing characteristics of vulnerability.

Ritualistic adherence to certain instructional procedures and school regulations might be reinforced by goal-diffuseness also. Lack of consensus on goals, owing to their multiplicity and vagueness, might encourage over-compliance with the *methods* of education. In fact, the "retreat to methods" in teacher preparation might need reexamination in the light of educational goal-diffuseness.

Goal-diffuseness also contributes to professional insecurity. Despite an emphasis on instructional skills rather than on terminal goals, clarity of terminal goals is probably an important condition for the development of technical competence. Unable to reach agreement on the efficacy of particular skills, owing partly to the vagueness of goals and to the problem of measuring attainment of goals, teachers lack *expertise* as a basis of authority, which relegates them to a quasi-professional status. We have already suggested several consequences for innovativeness that flow from quasi-professionalism.

Incidentally, it also seems likely that the difficulty of measuring outcomes would tend to demoralize those teachers who do not possess considerable personal self-confidence. The effect might be to lessen motivation to try out new practices, especially those that involve considerable inconvenience in the initial stages. In other words, a sort of fatalistic attitude may set in because of the difficulty of attaining objective certainty about a particular practice.

Formal coordination and control

Thus far we have virtually ignored the impact of the formal organizational context on the emergence of innovative roles. School systems contain elaborate means for rationalizing the flow of recruits through the system—through sequential and horizontal organization of the curriculum, through counseling, and through quality-control mechanisms that determine promotability and placement within academic strata. And there are also mechanisms for governing and rewarding the staff and for allocating resources throughout a large number of subdivisions. Further, because participation by the clients of schools is *non-voluntary* and because the clients are located *within* the organization, student control becomes an important organizational concern. Finally, owing to the commonweal function of education, accountability to parents and taxpayers is required, which necessitates further bureaucratic provisions. Because of all these management problems, school systems assume a bureaucratic

structure with a hierarchy of offices, a division of labor with specially trained incumbents, a proliferation of rules, an elaborate record-keeping system, and so on.[6]

We have already alluded to the effects of the managerial structure of education on innovative behavior in our discussion of quasi-professionalism, since it is partly due to organizational requirements that teachers are unable to achieve full-fledged professional status. Thus, they are required to use specific textbooks on certain subjects and allotted a specific period of time to deal with the client (which reduces *discretion*); they are held accountable to administrators (which reduces *collegial authority*); and they are required to control the client by means of formal sanctions (which lessens the importance of *expertise* as a basis of authority over clients, and may conflict with the *service* orientation of teachers).[7] In short, the bureaucratic setting of education creates strain for the professional role, which in turn produces some of the effects of quasi-professionalism already mentioned.

But organizational requirements influence the adoption and implementation of new practices in more direct ways, also. Many educational innovations are designed to meet the varied needs of students—or as educators say, to "individualize instruction." This objective is one of the core values of professionalism. But when pursued within the typical organizational structure of education, which is largely devoted to coordination and control, the objective is exceedingly difficult to realize. Carlson (1965) provides us with a good example. He found that teachers who were supervising programmed instruction "... were actually restricting the output of the students who were proceeding at the fastest rates."

> The logic of restricting output of rapid learners is tidy and makes good sense from at least one viewpoint. Explaining the same troublesome point to five students who are encountering it concurrently is less time consuming than explaining it to the same five students as they encounter it at different times. For the teacher who complains that there is never enough time, this appears to make good sense. In fact, insistence that all students move at the same rate, which is attempted in many classrooms, can be supported by the same logic (Carlson, 1965, p. 77).

The more rapid advancement of certain students conflicts with the principle of organizational efficiency that dictates the processing of *cohorts* instead of *individuals*. Perhaps one reason that medical practice has low

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[6] There may also be an historical reason for the emphasis of our schools on bureaucratic efficiency, as persuasively argued by Callahan (1962).

[7] See Blau and Scott (1962, pp. 244-47) for further discussion of the dilemmas arising from the confrontation of bureaucratic discipline and professionalism.

productivity is due to the difficulty of treating groups, which arises from the urgency of the individual client's need. Students are not usually perceived as "emergency cases," however, and must therefore await "treatment" along with their cohorts. Organizational efficiency is therefore allowed to become prepotent.

Fundamental changes in organizational structure, such as nongraded schools, might be required to reap the benefits of programmed instruction. And the non-graded pattern probably requires further modifications, such as the creation of teams of instructors so that information about individual pupils can be shared more rapidly. But this means that even slight departures from traditional methods of coordination and control might necessitate further organizational adjustments, thereby disrupting normal operations throughout a large sector of the school system.

Perhaps it is more common for these adjustments to be altogether avoided, which produces negative feed-back on the original innovation, as in the case of the teachers observed by Carlson. The hesitation to make further adjustments in the organization, then, may account partly for the "watering down" of innovations that is so frequently observed. And because the school can nevertheless point with pride to its core curriculum, its team teaching, or its programmed instruction when confronting either the public or other educators there is little pressure for bringing the innovation to full fruition.

To be sure, there exist relatively *non-disruptive* innovations, such as technological devices that chiefly supplement routine instruction; and there are even innovations that *reduce* organizational friction. Hayes (1966) claims that the creation of special classes for the slow-learning, neurologically impaired, and emotionally disturbed can often be traced to the desire to remove irritants from the classrooms. Obviously, the organizational context may determine the adoption as well as the non-adoption of innovations. What this suggests is that a comprehensive taxonomy of innovations should make allowance for *organizational consequences*. But considerable research is needed before specific features of innovations can be related to organizational response.

The combination of system attributes

Although we have tended to stress the consequences for innovative roles of each of the four organizational attributes taken separately, we have occasionally referred to problems that emerge from *combinations* of attributes. No doubt a thoroughgoing analysis growing out of empirical work would give greater attention to the interaction of these attributes. Pos-

sibly, some of the most critical problems facing change agents can be delineated only by consideration of these interaction effects. For example, the combination of the need for coordination and control, on the one hand, and professionalism, on the other, produces the problem of "structural looseness" (Bidwell, 1965). The structured isolation of teachers (in classrooms) makes coordination and control in the service of innovation quite difficult (Wayland, 1967). And because "remote control" mechanisms are necessitated (syllabi, student accounting, etc.), structural looseness creates problems of clerical overload for teachers, which aggravates their already insecure status. In addition, it permits teachers to preserve their illusion of autonomy while inroads continue to be made on their professional sovereignty.

FIGURE 1 summarizes our discussion to this point in the form of a flowchart. The diagram is not intended to represent an elegant theoretical system. Presentation in graphic form, however, might help clarify the linkages that require research.

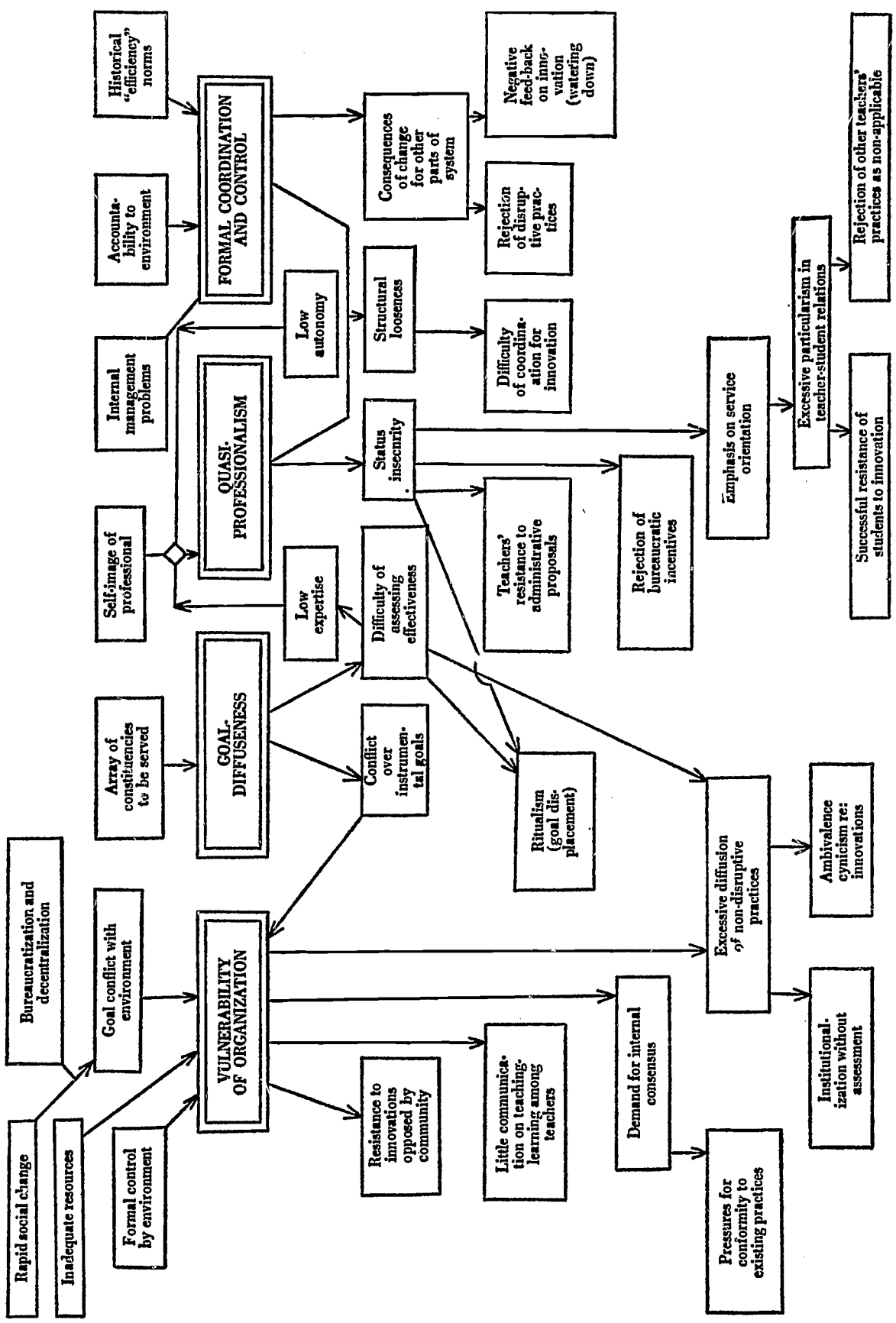
Existing and Needed Strategies

It seems to me that there are three classical strategies for inducing change in education.[8] Each strategy rests upon a major assumption about the motivations of practitioners. What might be called the *Rational Man* strategy is founded upon the assumption that practitioners are impelled by rational decision-making to formulate clear-cut objectives regarding the efficient allocation of resources. The Rational Man considers ignorance to be the chief barrier to innovation. The channels of influence employed in this strategy include didactic teacher preparation, research reports, and conferences—in short, all forms of one-way communication between the change agent and the practitioner. One-way communication is sufficient in terms of this strategy because the major need of the practitioner is *information.*

There is comparatively little entailed in pursuing the Rational Man strategy and the coverage is comparatively wide; hence, this strategy has much to recommend it. Unfortunately, the yield leaves much to be desired. What the approach overlooks is the necessity of learning about the practitioner's values and organizational circumstances by means of two-way communication, achieved either by face-to-face contacts or by detailed knowledge of the *typical* values and circumstances of the "target system." It also assumes that goals are few and clear-cut, when in fact

[8] The following comments are distilled from an earlier paper entitled "Images of the Practitioner and Strategies for Inducing Educational Change," (Sieber, 1967).

Figure 1—STRUCTURAL PROPERTIES AFFECTING INNOVATION



they are diffuse. Essentially, the strategy of the Rational Man neglects consideration of the four attributes of the educational system that were discussed earlier.

An alternative strategy involves the participation of members of the system and rests on the assumption that practitioners are willing and able to cooperate in new ventures. The strategy might therefore be termed the *Cooperator* strategy. Two-way communication is the hallmark of the strategy, and its proponents include school consultants, on-site evaluation experts, human relations experts, and demonstrators. The effort required by the Cooperator strategy is greater than the effort required by the Rational Man strategy. And, barring the development of a widespread system of "extension agents," the coverage is probably limited. What is lost in *extensiveness* may be compensated for somewhat by gains in *intensiveness*, however. Nevertheless, the yield of the Cooperator strategy in terms of the total educational system is probably as limited as that of the Rational Man approach. One reason is that the strategy overemphasizes the personalistic aspects of the practitioner's lot, and therefore requires intensive treatment of individual personalities. And what is more important, insufficient attention is paid to the status-insecurity generated by quasi-professionalism and to the formal organizational attributes of vulnerability, goal-diffuseness, and coordination and control. Thus, there is a tendency to view resistance to change in schools as a matter of personal insecurity, habit-formation, or sheer lethargy, rather than as a matter of status-insecurity, peer group pressures, or bureaucratic hindrances.

A third strategy is derived from the notion that practitioners are powerless to innovate. Even assuming that they have complete information and the ability to overcome their resistances, they would still be unable to make major modifications in the structure of education. This approach might be called the strategy of the *Powerless Participant.* Influence is provided through legal and bureaucratic channels with directives flowing downward and evidence of compliance flowing upward. The change agents operating under this strategy represent the three branches of government at local, state, and federal levels, as well as the various pressure groups at each level.

The effort entailed in the Powerless Participant strategy is great, but the coverage is quite wide because national or state action can reach into a large number of systems in a relatively short time. On first consideration, it would appear that the yield of the strategy is also great because many innovations in schools are supported by legal or bureaucratic regulations. However, these regulations are often applied to pre-existing patterns of behavior and norms; that is, they often serve mainly to legitimate

and to standardize a particular normative pattern. It is, therefore, difficult to know if it was a new directive that wrought a particular change, or if the change resulted from gradual diffusion facilitated by legal action. Further, there are many reasons to suspect that administrative directives within schools are averted, sabotaged, watered-down, and even rescinded in the face of opposition from students, teachers, administrators, or the community. The effects of quasi-professionalism and of vulnerability are often responsible for the subversion of formal directives. Also, the necessity of controlling and motivating students by non-formal means, mentioned earlier, exerts a corosive influence on formal regulations. In short, practitioners are by no means powerless to shape their organizational setting, although the power they exercise may not be exerted in behalf of rational innovation.

The three strategies fail because men are not wholly rational, cooperative, nor powerless. But in certain instances, they exhibit elements peculiar to each of the three patterns of behavior. What is needed, therefore, is a strategy that takes into account the conditions under which practitioners will respond to the tactics comprised in each of the three classical strategies. The needed strategy, in short, should possess the resources of all three strategies, and should include guidelines for their employment under particular conditions. I call the needed approach the strategy of the *Status-Occupant.*

In presenting the image of practitioners as Status-Occupants, it is assumed that they are imbedded in an intricate network of role relationships that holds its shape as a consequence of shared values, shared solutions to status problems, and shared sanctions for deviance and conformity. Efforts to change one component of this structure without consideration of the other components will ordinarily result in failure. Because much more thought needs to be given to the implications of our theory for innovative roles, I can here only suggest a few implications for strategy.

In light of the preceding theoretical discussion, it would appear that overhauling is needed at both the local and national levels. Locally, the organization of schools should be revamped to permit teachers to behave in accordance with their professional self-image. For example, a teacher who wishes to become a local expert on some new development might be allowed to apply to the school board for special authority to try out the development. If approved, the teacher would be provided with special funds, released from routine teaching duties, and authorized to modify regulations, reallocate resources, reassign students, and dole out rewards and penalties for those under his jurisdiction for a specified period, say,

four months. The role of local administrators *vis-a-vis* these teachers would be restricted to one of facilitation and consultation. Other teachers would probably agree to this bestowal of power on one of their peers because of their desire to have the same opportunity at some later time, their resentment of administrative domination, and their respect for the change agent's position in the informal structure of peer relations. The change agent, therefore, might have considerable assurance that his ideas would be given a fair trial.

Some such arrangement would increase professional autonomy, serve as an incentive for innovative proposals, and enhance the expertise of teachers. In effect, the change agent would simulate the role and authority of the teacher-principal of a small school whose effectiveness stems from his status of *prima inter pares*.

Outside the local setting it might be necessary to organize agencies that represent several national ancillary structures and that are intended to have national impact. Agencies such as these might be required to avert the problems arising from *local* and *regional* vulnerability, and to exploit *national* vulnerability to better advantage. A national base of operations is necessary to draw upon structures that are themselves nation-wide in scope and, also, to attract the best talent from all over the country. These agencies should not add to the profusion of staff organizations related to education, however, but should function as coordinative bodies. Thus, each agency would draw upon the resources of federal and state offices, publishing houses, accreditation agencies, universities, and the mass media—in brief, those powerful ancillary structures to which schools are already so highly vulnerable.

Each national coordinating body might focus its attention on a single innovation at a time so that resources and commitments are not spread too thin and duplication of effort is avoided. The tactics of the different change agents comprised in the three classical strategies mentioned earlier would be combined. Their efforts would entail new regulations or legislation, consultation and demonstration, summarizations of research evidence, development of new educational products, and mass communication among communities and schools. When a campaign centering on a particular innovation has been set into motion by lower level staff, the top planners at each agency could reconvene to consider their next innovative thrust.

It should be borne in mind that our two proposals for reorganization are simply by way of illustrating a strategy that combines the tactics of the three classical strategies, and at the same time overcomes their distinctive difficulties. These difficulties arise from the dominant *organiza-*

tional properties of education. Hence, in the final analysis, it is the organizational properties that need to be taken into account in the formulation of innovative strategies.

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CHAPTER
6

Richard Schmuck

Social Psychological Factors in Knowledge Utilization

"Knowledge is not practice and practice is not knowledge. The improvement of one does not lead automatically to an improvement of the other. Each can work fruitfully for the advancement of the other, but also, unfortunately, each can develop separately from the other and hence stuntedly in relation to the other."

Fritz T. Roethlisberger (1962)

This paper explores some dimensions of Roethlisberger's statement for transforming behavioral science knowledge into administrative practice in education. An abundant and rapidly increasing amount of useful research knowledge from behavioral sciences is available today for educational administrators and teachers. Behavioral scientists are producing relevant concepts, diagnostic devices, and practices in such critical problem areas for the educator as change (Watson, 1967a, Watson, 1967b, Miller, R., 1967, and Hollister and Bower, 1967); social problems (Coleman, J. and others, 1966, and Deutsch, Martin, 1960); classroom instruction (Fox, Lippitt, and Schmuck, 1964; and Amidon and Hunter, 1966), and leadership (Gross and Heriott, 1965; Culbertson, 1963; Amidon and Blumberg, 1966). Although some clearly are benefiting from this knowledge explosion, little of the total amount of behavioral science knowledge seems to influence the practices of a large number of school administrators. Responsibility for this state of affairs

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should not be lodged with the administrators alone nor with the behavioral scientists alone. The lack of knowledge utilization is truly social psychological in the sense that it involves both parties simultaneously interlocked in a complex set of ineffective communications.

One reason frequently given by the administrator for not using research knowledge more completely is that typically it is not directly related to the daily tasks of running the schools. Although this has been largely true, there now are many pieces of research such as referenced above that are directly relevant and potentially very helpful. Moreover, many other contemporary studies, if not directly relevant, have definite implications for school administrators, e.g., on change see Gardner (1963); in the area of social problems, see Clark, K. (1965); for classroom instruction see Bradford, Benne, and Gibb (1964); and on leadership see Likert, R. (1961) and Dubin (1961). Assuming that much of what is being produced today in research is either directly or indirectly related to administration, let us explore some of the social psychological factors which inhibit communication between behavioral scientists and educators. This paper will discuss some of the possible interpersonal and psychodynamic reasons for low levels of utilization of scientific knowledge in educational administration and suggest some implications for amelioration. I will begin by presenting some illustrative reactions of administrators to attempts by behavioral scientists for research utilization in public education.

During the past eight years, I have been engaged in activities aimed at bridging the gap between the science of social psychology and the practice of classroom teaching. These activities have brought me into direct contact with many superintendents, school principals, curriculum consultants, school counselors, and classroom teachers. I have received various reactions to action research projects most of which have been positive and supportive. However, there have been some skeptical, hesitating, and extremely negative reactions to action research, and I wish to recall some of those in the context of discussing some traditional attempts at knowledge utilization in education.

Perhaps the most traditional and least successful mechanism for research utilization in education is the professional research journal. It is likely that most educators do not read the behavioral science journals. Indeed, behavioral research articles usually are not written in understandable ways from the point of view of the administrator. Information coded in a form understandable to the scientist often is only useful among other researchers using a similar language code. Even at profes-

sional meetings where the researcher is able to view audience reactions, serious problems of miscommunication and misunderstanding arise because of the discontinuities between the language system of the scientist and the educator. When administrators are asked to read behavioral science articles, some typical reactions are, "There is too much interest in theory. I want ideas on how to handle specific problems." "I don't have enough time to read." "There is too much attention to proof and statistics." "Even after you wade through the article, you find that the researchers did not prove anything." From the perspective of the educators, these reactions are quite real and deeply felt. Some behavioral scientists have been similarly concerned and have been effective in advocating journals that are more directly relevant to the practitioner. Among the most notable examples are *Trans-action*, *Psychology Today*, *Journal of Applied Behavioral Science*, and *Theory Into Practice*. Even here, however, I strongly suspect that behavioral scientists are the primary consumers of these journals. The scientist, himself, finds refreshment in research reporting that is not so formal and which does not overwhelm with statistical analyses. Perhaps the scientist has actually satisfied more of his own desires than those of the educators in the production of these ostensibly "practitioner and lay oriented" magazines.

Since virtually everyone seems to know that educators do not read the scientific journals, one popular alternative for attempting research utilization in the schools is to bring in an outside expert consultant. The consultant presumably will bring to the school system many of the concepts and implications that could be gleaned from research journals if they were more readable and understandable. Moreover, the consultant hopefully will have integrated the materials, thus relieving the educators of that very difficult and time consuming exercise. The consultative work of the outside expert often results in giving the administrator an aura of using recent scientific knowledge but usually very little change or follow-up occurs after the consultant leaves. When the consultant is used extensively the relationship between the expert and the practitioner sometimes results in stances of dominance and dependency. Within the framework of such a relationship the consultant's information is reacted to either with total, but superficial, acceptance or with covert rejection, more often the latter. A frequent response is superficial compliance (Kelman, 1958) on the part of lower echelon administrators especially when the superintendent, out of a desire to appear modern, has encouraged the consultation or even initiated it. The most frequent covert reaction involved in this cursory compliance seems to

be something like this: "We are to do this because the boss wants it. This consultant hasn't been in this school before. How can he know what's going on here?" "This guy doesn't know what he is talking about. It's OK in theory, but that won't work here," etc.

In an attempt to overcome these resistances, applied behavioral scientists and experimentally minded educators have encouraged utilizing scientific knowledge by diffusing the successful program or experiment from one system to another. Often the outside consultant is involved also, but in this case, he brings to the school system a program that has had clearly positive effects in another place. Being asked to try a project which was successful elsewhere often stimulates a similar reaction of superficial compliance among administrators and teachers. But other, perhaps more familiar reactions also are involved. The administrator or teacher might say, "That system is different from ours. It doesn't really have the same kinds of problems." "That is a nice idea for that teacher in that school system, but it won't work with most of our teachers."

Researchers and educators schooled in group dynamics theory and practice feel that practices brought in from the outside without considerable involvement by those who are to use them usually are not successfully continued. Local initiative and participation is needed so that the new practice is not dismissed because it is a foreign importation. Thus, developing research knowledge from within the school system has been frequently recommended as a way of encouraging the use of scientific knowledge (Watson, 1967a). Here the knowledge used concerns scientific methods and processes more than any one particular theory or set of research findings.

Two principal patterns are employed; the primary one involves a small scale research trial project which precedes anymore widespread use in the system. Unfortunately, negative reactions toward those who first try the practice occur even when it is tested within a school system. Moreover, the educators who are not directly involved in the trial ask, "Who's getting a dissertation out of this?" This implies that the experiment is being done for personal gain rather than for the enhancement of the educational goals. Another common feeling is that the research will not reveal much anyway and the question often arises, "What good will this project do us?" "We've done research projects before, but they usually don't lead to anything."

Another approach, called survey data feedback, involves the collection of data from participants within the school system which are fed back

subsequently (Mann, 1957). Data, for instance, might be collected on creative practices that teachers are using in their classrooms. Such classroom practices might be screened by behavioral scientists and systematically fed back to other teachers (Kaufman, Schmuck and Lippitt, 1963). Another cluster of data might concern the achievement levels or school related attitudes of the students and be fed back in order to induce problem-solving activity in the teachers (Schmuck, Chesler, and Lippitt, 1966). Similar data can be collected from teachers on how they see staff relationships in the school or between the teachers and the principal (Watson, 1967b). Although methods such as these encourage positive problem-solving behaviors, they may also be discouraged by quite a few administrators. Some stated resistances are: "These data are interesting, but they don't tell us what we should do about it." "Now I see the data, how do we compare with other systems?" "Do the data mean we're good or bad?" "We don't have anymore time to work on this; it was interesting!" These and other reactions limit the usefulness of data collected from within the school system.

Three Problems in Connecting Knowledge and Practice in Educational Administration

The administrators' reactions to attempts at knowledge utilization described above are disturbing. We would hope that school administrators would scan and explore the results of behavioral science research in attempts to improve their abilities and skills. Many behavioral scientists and educational administrators are frustrated over the small amount of behavioral science knowledge that is used in administering schools. Let us explore three points in a social psychological analysis of the utilization process where problems occur. These points all represent gaps in the connection between research knowledge and administrative practice.

The first problem point involves the interpersonal relationships between behavioral scientists and school administrators. There is a definite lack of effective communication existing between them, even between applied behavioral scientists with social engineering interests and well-read school administrators who view innovation positively. From a recent search of the literature in the social psychology of leadership and small group processes (Schmuck, in press) along with my work as a human relations trainer, three primary areas stand out in which too little communication exists between researcher and practitioner.

The first and most outstanding example concerns research findings on effective leadership in small groups and in large-scale organizations. Research on small groups by Bales (1958), Cartwright (1959), Fiedler, (1958), Flanders (1960), Maier and Solem (1952), and associates of the National Training Laboratories (Lippitt, Gordon, 1961) have considerable relevant information for school administrators. In a parallel fashion, the recent organizational research by Argyris (1964, 1965), Herzberg and others (1959), Katz and Kahn (1966), and Likert (1961) is directly relevant to school administrators' needs to run an effective organization. While some industrial leaders attempt to use such findings, educators seem to proceed responding more to situational pressures and traditional expectations than to the latest research. Few school administrators appear to be aware that such relevant research exists.

Even more directly relevant research findings have been generated by Gross and Herriott (1965). They collected extensive data on a syndrome of principals' behaviors, titled Executive Professional Leadership, which was shown to be correlated to such positive outcomes in the school as teacher satisfaction, teacher innovativeness, and increased student learning. The research was quite specific in indicating those behaviors which made up the syndrome of Executive Professional Leadership, and was strengthened by having been based on a national sample of schools chosen through scientific sampling procedures. Ideally, this research would be read by most elementary school principals in the nation, yet this excellent work is better known, and I think more highly respected, by sociologists than school administrators.

Finally, a very helpful group of research reports in behavioral science treats the various uses of scientific observation systems, questionnaires and interviews (Kahn and Cannell, 1957). Considerable amounts of work have gone into the production of research methods to collect more accurate social psychological data. Such instruments are seldom used by school administrators to collect data on their own school or school system. Indeed, my experiences have indicated that teachers are more likely to use diagnostic tools in their classrooms than most administrators are in the school (Fox, Luszki, and Schmuck, 1966). School administrators seem to go about collecting data on their school system using a layman's naive theory of communication and information. They do not seem to be aware of sampling or of asking questions in ways that will minimize the bias in responses. Such data collection procedures could be very helpful in a school system doing its own problem-solving for creating a more effective organization. These examples of scientific

knowledge not now being used by many educational administrators are taken from my own experience and therefore center on social psychological content. But I believe this lack of connection between knowledge and practice is just as significant in other social sciences, e.g., the administrator could use more understanding of the political dynamics in his community and the way political pressures are exerted and affect his work, or we might expect him to understand better the role played by the economics of his community in educational decision-making.

A second problem point in connecting research knowledge to practice concerns the psychological linkages between the administrators' scientific knowledge and his actions. In this case, the administrator may know about the research; in fact, he may be able to speak and write about it, but it does not affect the way he behaves in his administrative role. One indication of this may be reflected in Gross and Herriott's (1965) finding that there is no relationship between the number of course hours an administrator has taken in graduate school and his leadership effectiveness as perceived by the teachers. If we assume that relevant concepts and research findings are presented, at least in some of the courses taken, it appears that this knowledge does not ameliorate the administrator's leadership skills.

Another example comes from a study in which I participated last year in the Philadelphia city schools (Schmuck, 1967). We engaged psychiatrists, clinical psychologists, and social workers to consult with teachers on classroom mental health for a twelve-week period. We measured changes in the teachers' perceptions of the cognitive meanings of student and classroom group mental health, their teaching practices and the students' reactions to the teacher. We found significant changes in some of the teachers' cognitions, especially in cases where the consultants had had public school experience, but failed to find many cases of changes in the teachers' classroom behaviors or in the students' reactions to the teacher during the school year. Cognitive alterations had occurred, or at least the ability to talk about classroom mental health had changed; but few behavioral changes occurred in the teachers' practices and the students noted very few changes in their class.

The third problem point concerns a lack of connection between the practitioner's action repertoire and the requirements of each natural situation as it arises. This occurs where there is inappropriate transfer of training or when the administrator has few skills in diagnosing situations and obtaining feedback. A major challenge involved in social practice is altering one's practice with changes and new demands in the situa-

tion. Examples are educators who think that a certain teaching practice will be equally as effective with all children and all classroom groups. Similarly, school principals sometimes make the mistake of assuming that one pattern of running staff meetings will work equally well from year to year with different staffs.

Two deterrents to such flexible responsiveness are a stereotypic view of behavioral science concepts and findings and a lack of skill in obtaining feedback from others. The stereotype involves a conception that behavioral science principles, especially on such topics as leadership and communication, are true regardless of the participants in the interaction and the nature of the situation. When the finding seems not to hold in a given situation, it sometimes is viewed as totally incorrect and is thrown out by the practitioner. Handling new situations flexibly involves considerable skill in obtaining feedback from other participants and seldom is part of the repertoire of either the educational administrator or the behavioral scientist.

Social Psychological Factors Related to These Problems

The likelihood of forming a close communicative relationship between behavioral scientists and educational administrators is conditioned by a number of factors. Physical proximity of the school to a university, the amount of funds available in the school to purchase new materials and to hire expert consultants, the superintendent's desires for educational achievement and recognition, and the "cosmopolitan" character of the school staff indicated by attendance at professional meetings and conventions all may play a part in encouraging communication between researcher and practitioner. However, interactions in which researcher and administrator actually influence each other in a face-to-face setting are very much underused, in contrast to one-way, more impersonal interactions. Such gulfs in communication encourage the emergence of in-group, out-group feelings similar to group prejudices, discussed by Allport (1954), which are accompanied by mutual stereotypes, low levels of trust and high amounts of suspicion. School administrators are viewed by the researchers as being unsophisticated, anti-intellectual, and dependent, while researchers are viewed by educators as wanting to base everything done in the school on research and as having their "heads in the clouds." Administrators are seen as "flying by the seat of their pants," as not interested in achieving educational goals, and as primarily concerned with organizational maintenance and smooth functioning. Researchers are viewed as "not in the real world," as "feathering their own nests" and not as contributing to educational improvement. They are cynically called

"superior" individuals but actually are viewed as inferior because they are unable to be practical and down to earth.

Stereotypes and antipathies are intensified by a lack of two-way communication. As communication between researchers and administrators decreases, the initial stereotypes and antipathies of each are less likely to be modified than if interpersonal give and take is continued. Indeed a lack of communication often increases negative feelings even more as Newcomb (1947) discussed with the concept of autistic hostility. The negative stereotypes that each holds of the other become more negative and well established because they are controlled by private fantasies (autisms) rather than realistic perceptions and experiences. The lack of communication, the lack of giving and receiving feedback, as well as the sheer physical distances between the university and the public school help maintain the prejudices.

Not only is attraction low between researchers and administrators because of this inter-group conflict, but also because to some extent each challenges and threatens the other's intelligence and professional role status (Pepitone, 1964). The researcher fears that his research may not be relevant or significant; moreover, perhaps he really does not understand very much about the processes of the school. The administrator fears that the researcher will uncover weaknesses in his school that would establish how poorly he administers the building compared with other principals. Or the administrator may be concerned that his lack of knowledge about the rudimentary aspects of behavioral science will be made public. It is psychologically safer for each to remain separate and distinct from the other.

This state of affairs can be illustrated by several personal observations of interpersonal circular processes involving researchers and administrators. In one such relationship, a school principal with a self-concept involving feelings of inadequacy in behavioral science perceived that he was viewed as incompetent and unsophisticated by the researcher. The administrator's initial feelings about the researcher, when he was able to communicate with him, were trusting, optimistic, and dependent. Moreover, he perceived the researcher as being very competent and skillful. These feelings and perceptions resulted in the administrator's acting friendly, respectful, and seeking the support and direction of the researcher. Moreover, he had an almost compulsive readiness to accept any signs of friendliness and support from the researcher.

The researcher, on the other hand, possessed a self-conception of personal adequacy along with a negative attitude toward others depending upon him and a dislike for persons who were overly demanding and

deferential. The researcher reacted in a hostile fashion toward the dependent administrator. Out of these feelings, a distrusting and commanding orientation emerged which resulted in impersonal avoidance. In turn, the researcher's behaviors were perceived as unfriendly and nonsupportive by the administrator whose initial trust was betrayed and whose failure to achieve a rewarding relationship led to covert hostility and withdrawal from the researcher.

Another instance of a negative circular process involving a researcher and an administrator was one in which the administrator had a positive evaluation of his own abilities and skills, particularly the ability to administer his school effectively. He also perceived himself as being negatively judged by the researcher and he felt disrespect and dislike for him. His mind-set involved distrust and a desire to make the researcher appear inadequate and foolish, which often resulted in hostile responses toward and active resistance of the researcher's attempted influence.

The researcher perceived the administrator's behaviors as unfriendly, restricting, and demanding and was set to defend himself. He had a self-concept of relative adequacy in relation to the administrator, perceived the administrator as not liking him, and responded with negative feelings toward the administrator. The researcher sometimes commenced competitive influence attempts toward the administrator, especially in front of the school staff which confirmed the administrator's distrust and which accentuated his desire to put the researcher on the spot with the teachers.

One ingredient lacking in many researcher-administrator relationships is trust. Mutual trust and confidence is most likely to occur when people are positively oriented to each other's welfare (Deutsch, 1958). Although some mutual concerns undoubtedly are present, the university-based researcher and the school administrator have very little day-to-day concern for each other. Furthermore, trust has little opportunity to develop because there are so few cooperative relationships and very little communication between them.

Deutsch (1960) studied trust and suspicion within three normative frameworks. He showed that trust is enhanced by a norm of cooperation, while suspicion is engendered when competition imbues the relationship. A third social arrangement in which the parties are individualistically oriented leads to trust about half of the time. My impression is that the relationship between researchers and practitioners is mainly one of separatism and fits Deutsch's individualistic category. Further study by Deutsch revealed that trust can be established between parties with individualistic orientations through active face-to-face communication, provided the communication has the basic normative features of cooperation.

The illustrations of negative circular processes described above obviously lacked these basic features of cooperation. Communication takes on cooperative features when the parties share their intentions toward each other and express their expectations to each other about the relationship. Much of the trouble involved in the circular processes described above came about because intentions and expectations were hidden and allowed to grow into still more negative autisms. Distrust is engendered further by each party believing the other has more to gain through exploitation than through collaboration. This appears to be especially true of the administrator's perceptions and feelings concerning the researcher, for he often feels that the time and energy his staff spends on a project are not adequately rewarded by improvements in the school. Often, in fact, the school organization is disrupted and some teachers are displeased with the administrator for "getting them into the project." The administrator often views researchers as benefiting through a dissertation or publication which will have little, if any, use for the school. Conversely, distrust for the educators' complete commitment to a project often is felt by the researcher. The researcher sometimes feels that educators exploit him because they are mostly interested in credit toward an advanced degree with seemingly little interest in the research evaluation which requires control groups, careful historical records, and a great deal of effort in filling out before and after questionnaires. Another reason for distrust is present when each perceives that he is unable to exert much control over what the other does in the relationship. The educator is anxious over the kinds of information that the researcher may discover, while the researcher is apprehensive that the educator will bias his responses in order to appear more respectable and socially acceptable.

The distrust and suspicion experienced by both researchers and administrators are supported by their respective reference groups. Many researchers respect the expectations and demands of a cosmopolitan, professional group which stresses the manipulation of ideas and abstractions as an end in itself. Moreover, the researcher's associates believe that one should search for the best, most rational, most economical and most elegant solution when problem-solving. The "scientific community" stre es the pursuit of truth and rewards clear explanations, depth analyses, a... advances in understanding. The researcher's primary gratification comes from receiving favorable evaluations for written products from the experts and perceived authorities in his field.

The major reference groups of the educational administrator tend to reside in the more immediate environment, and to be more directly tied to the daily operations of the school. The administrator reacts most often

to the expectations and demands of those in the neighborhood, the larger community, and the school system who emphasize concrete thinking, the careful expression of opinion, and the control or manipulation of feelings. The administrator's contacts stress the value that in solving a problem, one searches for the possible course and hopes that the solution chosen is durable. At all times, however, the administrator must be ready to back off and to see another alternative approach to the problem. He is often expected to take action based on inadequate, unreliable, and sometimes conflicting information. Unlike the researcher, his personal commitment involves neither the "truth" nor explanation and understanding; rather, he responds more to the opinions of others, to the immediate demands placed upon him, and to problem situations as they arise. The administrator attempts to overcome barriers, to communicate more effectively, to gain interpersonal influence, and to establish group consensus. His most significant gratifications come from the development and maintenance of effective and satisfying relationships in the school. His ability to run things smoothly is often highly rewarded by his reference groups.

These two sets of inconsistent group norms and pressures are the social foundations for ineffective communications between researchers, and administrators. Researchers view administrators as diplomatic, unscholarly, and short-sighted. These perceptions are partially correct because of the role expectations of and social pressures on the administrator. On the other side, administrators see behavioral scientists as impractical, unaware of reality, lacking in the ability to handle daily problems effectively, and tending to avoid the difficult interpersonal relationships that are inevitable in running any organization. Both sets of perceptions are partly accurate, especially when the respective reference group pressures discussed above serve as the frameworks of each party.

Let us turn now to a discussion of four psychological processes which accompany these interpersonal dynamics and appear to play significant roles in keeping behavioral scientists and administrators from communicating effectively. First, each party, the researcher and the administrator, selectively perceives aspects of the other's behavior. The researcher often does not perceive the turmoil of the administrator in handling daily problems. His long-range perspective and a predilection for cautious objective analyses do not support empathy for the administrator's need to please many people promptly. The administrator often does not perceive the high value that the researcher places on objectivity and unbiased analysis, and fails to see how his inconsistencies and lack of respect for careful analysis disturb the researcher.

Along with selective perception, there are distortions in memory which

limit the relationship's effectiveness. The three psychological processes discussed by Allport and Postman (1945) referred to as leveling, sharpening, and assimilation have relevance here. Leveling involves reducing the content remembered about an event by forgetting most of the details, making the event more concise, and remembering only major points. Sharpening refers to the converse process wherein the person remembers specific points that were highlighted for him or that stood out because of their uniqueness or strangeness. Sharpening involves selective perception and retention. Assimilation, the most complex process, refers to the person remembering things in terms of his personal values, motives, expectations and previous information. New messages are understood within a personal framework that already exists. These three processes have been observed to occur in so-called derivation conferences with school administrators. The goal of a derivation conference is to stimulate participants to derive implications for their work from established research findings in behavioral science. It is extremely difficult to discipline the educator or any practitioner for that matter, to derive implications from one finding at a time. Moreover, the practice suggested by the administrator often is not supported by the research finding but is tangentially related to it. Sometimes, one finds that the educator's frame of reference is so limited that he is unable to see any connections between research and practice that are different from those he has been carrying around in his mind before the conference.

Perhaps the most significant psychological barrier to knowledge utilization in education is the low value many administrators place on the products of behavioral science. Although the administrator usually values new ideas, he often does not perceive researchers as contributing very many useful practices. Going to special conferences, especially those that are one-day and two-day conferences, is viewed as a way to get out of the school environment for a while. It is a rest period, a "vacation," and might be thought of as a "day off." Seldom is the conference perceived as involving more work, energy, and concentration than the daily tasks of the school or as contributing useful ideas to the daily operation of the school. Furthermore, the designs of such conferences usually do not encourage value confrontation, introspection and significant personal learning. The educator is to listen passively, allowing selective perception and distortions in memory to help maintain and reinforce his original conceptions of effective school administration.

Finally, psychological resistance to getting involved in close contact with a researcher involves the self-concept of the administrator. Getting involved with a person who challenges the way things are going threatens

one's view of his own effectiveness. Moreover, the perception of oneself as a prime mover and organizer, which satisfies the administrator's desires for control, may be undermined by the researcher's challenging his effectiveness. Collaboration may mean a loss of interpersonal influence and respect which could represent significant losses to the administrator who feels he must have these as bases for day-to-day action with his staff.

Even with all of these interpersonal and psychological processes working as barriers to effective administrator-researcher communication, many significant interchanges do occur and some educators do benefit greatly from the new knowledge they obtain. When effective communication does occur, a new set of problems may arise that are concerned with building connections between the administrator's new knowledge and his role performance. The administrator who often possesses no effective skill for putting new knowledge to use may understand what steps are necessary to achieve a goal, at least cognitively, but still may not be able to carry them out in his role behavior.

Skillful administrative action requires more than correct intent and practical research knowledge. Educational administrators who can indicate an effective technique to follow while discussing or writing about a situation in the abstract may easily become confused in the natural situation and actually have their behavior backfire in its intended effects. Most social skills in any type of administration require considerable practice before they are spontaneously available for use in real role situations.

As an example, it is not uncommon in schools for the principal and first year teachers to segregate themselves from one another despite their strong interests in interacting, and despite their knowledge, in the abstract, of what might be done to bring about communication. However, the principal is concerned that if he initiates communication, it will be viewed by the teacher as snooping into her classroom practices and perhaps as prematurely evaluating her competence as a teacher. The new teacher fears that communications which she initiates with the principal might be viewed as signs of dependency and requests for help which, in turn, might be viewed as personal weaknesses by the principal. The principal usually wants to offer help and the first-year teacher often wants to confer and receive help, but both lack the "ice-breaking" skills necessary. Their actual behaviors clearly are inconsistent with their interests and the principles of communication they undoubtedly learned at a cognitive level in college courses.

Inconsistencies between knowledge and action of administrators are supported by some interpersonal dynamics in the school. In all groups, role expectations develop and become stable over time. In the school,

teachers form stable expectations for the principal's behaviors and the principal conceives of ways in which he expects his teachers to behave in their roles. New knowledge that implies innovative actions forces some alterations in these social expectations. If the knowledge implies that the principal should modify his behaviors in relation to the staff, the principal must also change the role expectations of others. In many schools, this represents a formidable task because role expectations for the principal are maintained by teachers, students, parents, other administrators, as well as the school board. The principal feels restrained and frustrated by these expectations and often continues to behave as he did before, even with the new knowledge in mind.

The administrator's reluctance to transform new knowledge into revised practice very often is strongly supported by his fellow administrators. Through the joking comradeship of peers, the administrator is reinforced in his belief that scientific knowledge applies to ideal conditions and that such circumstances seldom are present in schools, especially his school. He thinks to himself that "it would be nice to try that" but it would "disrupt so many of the relationships in the school so as to make the new idea impractical." Peers unconsciously collude to keep the status quo by supporting a response of futility in relation to the introduction of new approaches. By so doing, each feels relieved of the responsibility for putting new knowledge to use.

Another factor that supports the administrator in not converting knowledge into practice is the social structural division between the "role of administrator" and the "role of student." Most behavioral science knowledge which the administrator is asked to use is communicated in contrived learning settings in which there is an instructor or consultant on the one hand, and students or learners on the other. The administrator plays the role of a "student-learner" in such settings and is asked to remember and use what is being communicated. Because of his previous experiences as a student, the administrator understands that the major expectations for him as a student have to do with his being able to discuss or write up the topic in an intelligent manner. Seldom has he been asked to behave differently as a result of classroom learning. This "parrot-like," intellectual attitude, which is well documented by observers of colleges and universities, discourages making the knowledge to practice connection. Moreover, such an attitude is supported strongly by peer group norms, since they too experienced the same set of expectations as they moved through college and graduate school.

Along with these social factors are some psychological processes that make it difficult to build a linkage between behavioral science knowledge

and revised practice. The first of these has to do with unclear goals held by the administrator. Partly because of the many day-to-day pressures on him, the school administrator often manifests a maintenance orientation toward the school; his major task seems to be keeping the organization running. The administrator's educational goals often are thought of in very general ways or not thought about at all. Discrepancies between the administrator's goals and his perceptions of actual conditions can create tensions that serve as motivating forces for improvement. When goals are unclear, it is difficult to know when he is falling short of his objectives. Moreover, even when the administrator does have clear goals, discrepancies can occur if he lacks skill in measuring the actual state of affairs. Little motivational tension is felt when either the ideal or the actual condition is unclear.

Other psychological processes which deter knowledge utilization have to do with the motivational bases of administrative behavior. Atkinson's model (1966), useful for describing these processes, proposed that the tendency to act is determined by a motive force, an expectancy factor, and an incentive value of acting, all put together in a multiplicative relationship. Applying this theory, we might state that the tendency to try out different behaviors in the school would be a function of a motive to achieve, multiplied by an expectation of putting across the new behavior successfully, multiplied by incentive or reward for accomplishment.

The motive force to achieve is viewed by Atkinson as a drive which arises from a relatively stable aspect of personality. Atkinson (1958) has discussed achievement, power, and affiliation as three significant motives involved in human action. McClelland (1961) has shown that the achievement motive is correlated with risk-taking behaviors and the tendency to innovate. It may be that many educators are more concerned with affiliation, i.e., maintaining warm and congenial relationships, or with power, i.e., maintaining hierarchial interpersonal relationships, than they are with achieving excellence or competing with some standard of excellent performance.

Even when the administrator possesses a high achievement motive, however, his expectancy for success or perceived incentive for accomplishing the new action may be low. With so many personnel in the school system expecting him to maintain more traditional actions, he may feel that attempts at new behaviors will not meet with much success. Only in situations in which all members of the school face a common crisis, such as in major budget cuts or demands of community pressure groups, would it be acceptable for the administrator to change his behavior radically (Hamblin, 1958). Incentive value for change in behavior often is reduced

when one is unable to get fairly immediate feedback on how well his behavior affected the situation. When criteria for success are unclear, when goals are unclear, or when one has difficulty in measuring the actual state of affairs, it is difficult to know how well or badly one has done. The educational administrator often finds himself in this situation.

Perhaps the most basic reason for a lack of connection between research knowledge and administrative practice has to do with the manner in which the knowledge was originally learned. We have already discussed how norms and expectations influence a separation between the role of learner and the role of administrator. The method of training involved in translating knowledge into practice also is an important factor. Verbal learning is not the same as skill learning. The exposition of research knowledge and implications for practice can be expected to help the administrator *to talk* about using the findings in his work, but only behavioral experience can train the administrator *to practice* in a different way. Furthermore, such practice should occur at several different times, separated by periods of rest to allow the administrator to internalize the new behaviors. Learning curves often exhibit plateaus or periods of relative standstill, before improvement resumes (Berelson and Steiner, 1964). Periods of behavioral practice should be separated by intervals of rest; and plateaus in learning might better be viewed as indicators of fatigue than as resistance and defensiveness. Generally, behavioral practice should involve situations directly related to the administrator's job and should occur in a relaxed, anxiety-free, non-evaluative environment. Often practice in fantasizing behavioral responses before actually trying them out also facilitates more complete behavioral learning. It is likely, furthermore, that the administrator will bridge the gap between knowledge and practice more effectively if the behavioral practice concerns behaviors that are very important to him and if the try-outs take place in pleasant and congenial circumstances.

The third problem point in connecting research knowledge to administrative practice is perhaps the most difficult to solve. Even when one assumes that the administrator has entered into effective communication with the researcher and has internalized the knowledge so as to have modified his role behavior, the issue of relating role behaviors appropriately to different situations is still present. Put another way, the effective utilization of research knowledge often breaks down when new behaviors are used indiscriminately in diverse situations. For instance, the administrator who has learned that he should be more non-directive in leading a discussion may treat all meetings in the new way without regard for the goals of the meeting or the personalities involved. Another administrator

who has learned to explore the feelings of persons publicly may do so even when such communication may be superfluous to accomplishing work goals, as in group situations in which the tasks are well understood and favored by the participants (Shaw and Blum, 1966).

Problems arising from mis-use or over-use of research knowledge can be as difficult as those which result from not using the knowledge at all. Attempts at solving such problems might involve training administrators in becoming sensitive to others' reactions and in increasing their skills in obtaining and using feedback from them. Even though simulation is very helpful in bridging the internal psychological gap between knowledge and practice, no artificial practice is a completely adequate substitute for direct experience in learning to make role behaviors appropriate to different situations, provided the administrator knows how to learn from his experiences by obtaining feedback (Daw and Gage, 1967). Actual experience in the natural setting of the school offers the administrator an opportunity to build his own strategies of searching for cues that signal new behaviors on his part, to test the effectiveness of his responses to these problems, and to change his behaviors in view of the feedback he receives.

Goal ambiguities as well as the role expectations of others also serve to inhibit the appropriate uses of new behaviors. When goals are unclear, it is difficult to know when one's behaviors are successful. Without feedback, little learning can take place about the appropriateness of certain behaviors for selected situations. Also, new behaviors may be difficult to use because of the staff's stable role expectations. Once new behaviors are operational and the staff has made the necessary modifications in their expectations, it is even more difficult to make additional changes. To overcome social deterrents such as these, the administrators must establish a norm which supports the experimental trial (Argyris, 1965) and develop a procedure for the school staff to evaluate itself (Jenkins, 1948). In such a school climate, the administrator could be free to try many different approaches and to obtain feedback on all of them from his staff.

Some other psychological processes also play a role in keeping the administrator from using new knowledge appropriately. Of these processes the strongest is the human tendency to strive for psychological consistency. It may be difficult or at least uncomfortable to hold at the same time two apparently opposite conceptions in one's mind. Thus, it is peculiar to imagine that direct or indirect leadership approaches are both equally valuable. The strangeness is reduced when one understands that one or the other approach is more appropriate in different group situa-

tions and with different types of people. Or as Dubin (1965) has shown, leadership behavior positively affects the productivity of workers if it is appropriate to the technological setting. The more production resembles a unit or batch technology, the greater is the probability that worker autonomy and indirect leadership will be effective. Close and direct supervision is more appropriate when technology resembles a continuous production system. The school might be analogous to a unit technology, each classroom or every child could be considered as a product of the school. On the other hand, when one considers the class or student as progressing through the school from one teacher to another, the image conjured up is a continuous production system. In order to utilize effectively ideas such as Dubin's, the administrator must have many different concepts and behaviors within his personal repertoire at any one time. This requires a quality of flexibility and openness which many persons find difficult to express.

Some Attempts at Building Connections to Transform Knowledge into Practice

The foregoing section of this paper has analyzed some social psychological issues and problems in the knowledge utilization process in educational administration. Now I wish to go beyond analysis to suggest a few action implications. Let me begin by listing ten clusters of social psychological assumptions important for building connections between the production of research knowledge and the improvement of administrative practice in education.

1. In order for the educational administrator and the behavioral science researcher to communicate effectively, there must be trust, openness, and some attraction between them. Trust can be increased through collaborative participation in cooperative enterprises. Cooperation, rather than competition, must be established between them. A norm of cooperation is facilitated when both parties communicate to each other their most significant intentions for entering into a relationship and their expectations of each other's behavior in the relationship. Moreover, cooperation can be maintained best when each party is able to tell the other that his expectations are being violated. Such open feedback between the two parties will help keep the norm of cooperation viable.

2. Cooperative activity entered into by the educator and the researcher should be structured so that each will directly benefit from it. The administrator should be able to see how the project will help him in more effectively accomplishing some of his school's goals without spending very

much additional time or money. The researcher should be clear on the kinds of theoretical or practical contributions he will make by entering into the relationship.

3. A period of time should be set aside at the beginning of any collaborative project for a discussion of the forces which might inhibit either the administrator's or researcher's participation in the project. Public discussion of restraining forces and how they might be overcome is an important part of "unfreezing" both parties for collaboration. Furthermore, covert resistances and anxieties may be raised and discussed, thus strengthening the interpersonal bonds between researcher and administrator.

4. The researcher and administrator should discuss and agree upon the superordinate goals that they share for the collaborative project. Even though both live in different sub-cultures which tend to encourage stereotypes and isolation, it is likely that both also share certain broad goals or values, e.g., higher achievement levels for students, more satisfaction in teaching for teachers, and more effective teaching in terms of student mental health and motivation to learn.

These first four assumptions concern the lack of connection between researcher and administrator. Let us turn now to the problem of building internal psychological linkages between knowledge gained and useful actions tried by the educational administrator.

5. The administrator's values and goals should be sharpened and more clearly defined during the knowledge utilization process. Whenever possible, objective instruments should be used and the administrator should be able to compare his goals with those of others. Also, the administrator should be stimulated to operationalize his goal statements so he will be able to get some measurement of how close or far he is from accomplishing them (Mager, 1962).

6. Research knowledge, once acquired by the administrator, should be transformed into practice through simulation activities (behavioral try-outs). First, he might attempt to think through his behaviors by fantasizing them. Then as a part of behavioral practice, the administrator might attempt to identify those restraining forces within himself that keep him from using the new practices. Also he should learn how to receive feedback from the try-out and to act on the feedback by attempting the new practice several times.

7. Although simulation is extremely important, so is trying out the practice in the real setting. The administrator might be supported during

this difficult period by a seminar group comprised of other administrators meeting regularly to help each person over learning plateaus and to support revisions of the original practice whenever appropriate.

8. For many innovations, especially those in leadership and interpersonal relations skills, it will be necessary that the entire school staff, or a sizable part of it, be involved in learning how to handle the change. Thus, role changes in administrators often should be accompanied by alterations in the expectations of the staff members.

Finally, let us turn to the problem of building connections between the behavioral repertoire of the administrator and the variety of educational situations he faces. The following are relevant assumptions on which to build programs of action.

9. The administrator should receive training in how to give and receive feedback. His behavioral repertoire will be used most effectively when he recognizes the responses of others accurately. Skills in defining goals and in obtaining feedback are necessary for the effective use of behavioral science research findings. Also, as part of this process, it would be valuable to identify those restraining forces present in the social situation that might limit the value of the new practice.

10. The administrator should receive training in flexibility and open-mindedness (Harrison, 1966). Often behavioral science findings seem to or actually do contradict each other. The ability to keep many seemingly contradictory principles in mind concurrently is necessary for the effective use of behavioral science research findings.

Taking action to bridge the knowledge to practice gap in education requires operationalizing at least some of these assumptions. In recent years, federal legislation permitted the establishment of research and development centers, regional educational laboratories, Title III dissemination programs, and Educational Resources Information Centers. Individually and in combination these new organizations could exert a strong influence in making behavioral science knowledge useful in education. However, even with these new social structures, increased knowledge utilization in educational administration will not occur easily because of the interpersonal and psychological processes discussed above.

Unfortunately, there has not been extensive work done on overcoming some of these barriers to knowledge utilization. Much more effort has gone into improving business organizations and government bureaus through the utilization of behavioral science. It still appears to be easier to capture the interest of a businessman or government leader in the use

of behavioral science than it is a public educator. One of the few procedures for building a technology of knowledge utilization which has appealed to businessmen, government employees, and educators alike was designed by the National Training Laboratories, now retitled the Institute for Applied Behavioral Science. Here the major learning method emphasized is one in which participants are helped to diagnose and experiment with their own behavior and relationships in a specially designed environment. Behavioral science concepts and findings are tried out behaviorally by the participants. Participants become both experimenters and subjects in joint learning activities. Such a methodology seems well suited for facing the social psychological issues raised in this paper.

New practices in educational administration usually involve new patterns of human behavior, and new behavior patterns cannot be passed along like a new physical product. The adoption of a new practice will not occur if it is incompatible with the values, attitudes, and behavioral skills of the educator. Since the administrator is a member of, and accountable to, an intricate social organization, he must take these interpersonal relations and social pressures into account in initiating change. Learning to practice administration differently, then, is not a simple matter of absorbing written or spoken knowledge which is transmitted. An effective learning process will involve various psychological "levels" of the administrator and this is where the methods of persons associated with the National Training Laboratories are relevant. Let me outline the type of program design, using some of these methods, which might help to bridge the gap between research knowledge and administrative practice. This proposed design is addressed especially to assumptions 5 through 10 listed above. More thought and work still need to go into establishing appropriate social arrangements for realizing assumptions 1 through 4.

Let us assume that a behavioral scientist who already is attractive to some educators organizes a few of the most significant research findings available in a given educational problem area. For example, findings on organizational dynamics and change or perhaps the latest research knowledge on collective bargaining might be organized. Research findings on leadership and group processes or maybe findings on minority group dynamics in relation to the school could be summarized. The particular knowledge area chosen would not matter; however, it would be important to choose material that could be summarized in a few pages of generalizations and at the same time be meaningful to the administrator.

Those who train educational administrators in graduate school classrooms often are dissatisfied with their own methods of instruction. They have in mind concepts and research findings to teach in a selected content

domain but feel frustrated about the low incidence of use of these ideas by the practicing administrator. The employment of traditional teaching methods such as the lecture and assigned readings, and the student's passive reception of new materials allow for very little cognitive growth and attitude change, tend to produce dependency, and do not support the development of new behavioral skills. Other instructional approaches such as group discussions, introspective involvement, role-playing, and the analysis of one's own behavior have been developed as alternatives. These methods appear to provide for more meaningful personal experiences because they engage the administrator attitudinally and behaviorally. Even these newer approaches, however, often fail to have much impact on the administrator's actual role performance. Though meaningful learning experiences may be provided by these training methods, what is learned often is not brought back to the school. The administrators sometimes cannot follow through on commitments made during training because of the many expectations and pressures that impinge on them in the school. This issue of the transfer of training is seldom systematically planned for and worked out during and after a training event.

The two designs described below represent attempts to consider the social psychological factors involved in keeping the administrators from using behavioral science knowledge. The two program designs might include the following sequences of activities:

Administrator development training

The first design for a training program focuses on the individual administrator's development. Ten stages can be suggested as part of such a design.

1. Some sort of T-group experience to help the administrators become more reflective about their own behavior would come early in the program. The major goal of this activity would be to help administrators to think about their own practices and to increase their readiness to accept new practices. A secondary goal would be to impress upon the administrators that their own behaviors, and not thoughts and values, affect the feelings and reactions of those who work with them. (Bradford, Benne, and Gibb, 1964).

2. Behavioral science knowledge relating to some aspect of administrative practice would be presented. Discussions would be held on how this knowledge relates to the administrator's goals and role demands. Use of the knowledge, or at least some part of it, would be established as an

important objective for each administrator. T-group experiences would support the cognitive explorations of this phase.

3. Diagnostic skills related to the domain of behavioral science would be discussed and the administrator would become better acquainted with how to measure the effects of his role behaviors related to that domain. For example, if research findings on leadership are presented, the administrator would learn how to measure the effects of his leadership behavior. Whenever appropriate, administrators in the program would be asked to give feedback to one another on these same behaviors. As the administrator becomes more aware of his own characteristics, he may make fewer errors in perceiving how others are thinking and feeling (Norman, 1953).

4. Specific ways in which the new knowledge might be used in practice would be "brainstormed" and refined. Each administrator would be asked to think through the various ways he would behave in attempting to implement a given research findings. He might fantasize difficulties that he anticipates in using the new practice effectively.

5. These practices would then be tried out through role-playing and immediate reactions would be given by the other administrators in the group. At the same time, several different observation schemes might be introduced and some administrators would be asked to serve as observers and to give structured feedback to the role-players.

6. Skills in giving, receiving, and using feedback would be discussed and the role-playing vignettes might be repeated again in attempts to use the feedback.

7. The administrators next would be asked to make commitments to try out some of these practices in the "real" school setting. Force field analysis would be used to explore the facilitating and restraining forces impinging on following through with the plan (Coch and French, 1948). Attempts would be made to reduce the strength of some of the restraining forces either through revisions of the practice or by helping the administrator to gain more confidence by simulating the practice still once more. One effective means for gaining commitment is to have the administrator record on a tape the thoughts he has about the practices he will try in his administrative role.

8. At a later session, after the administrator has had an opportunity to get started on the new practice, the tape would be played back as a reminder of the specific details of the practice. If the original commitment was unrealistic, changes can be made at this point in the techniques used to introduce the practice.

9. The administrator now collects some data about the effects of his practice. He might use questionnaires under certain circumstances, but most often collecting verbal or non-verbal feedback from others will be sufficient.

10. During the time when the practices are being tried out, group discussions with fellow administrators would be held, perhaps once a week or once every two weeks, to support each administrator's efforts and to revise plans further for utilizing the behavioral science knowledge. Attention would be given to how the practices need to be modified depending on the nature of the natural situations.

Organizational development training

The second design involves an approach directly focused on having an impact on the social system of the school. It aims at modifying the faculty's expectations and pressures that support the status quo so that innovation can occur more easily. Eight stages can be suggested as parts of this design.

1. An organizational training experience, involving the entire faculty, would come early in the program. Its purpose would be to help the faculty become more aware, open, analytic, and skillful about its interpersonal relationships, communication patterns, behavior norms, decision-making processes, and group problem-solving skills.

2. Behavioral science knowledge relating to some aspect of school staff processes would be presented. Discussion would occur on how this knowledge relates to the faculty's goals and role demands. Application of some aspects of the knowledge would be established as an important objective of the staff. The organizational training activities would support the cognitive explorations of this phase.

3. Diagnostic skills related to the domain of behavioral science would be discussed and the staff would become better acquainted with how to measure the effects of its group processes related to that domain. For example, if decision-making is being discussed, the staff would learn how to measure its expectations about and procedures of decision-making. Also, the entire staff would collect data from itself on its decision-making processes.

4. Specific changes in staff procedures would be "brainstormed" and refined next. The staff or representatives of the staff would be asked to think through the various ways they might implement a given research

finding. They might also fantasize about the difficulties that they would anticipate in using the new procedures effectively.

5. The new procedures would be tried out by the staff on a trial basis. A panel of staff members would be asked to observe the new procedures in action and to give feedback about them to the entire staff.

6. Skills in giving, receiving, and using feedback would be discussed and tried out as part of the feedback from the panel of observers.

7. After a trial period, the staff would be asked to make commitments to continue the most effective new procedures. Force field analysis would be used to explore the facilitating and restraining forces impinging on following through with the plan. Attempts would be made to reduce the strength of some of the restraining forces either through revisions of the practice or by helping staff to understand the new procedures more thoroughly.

8. A panel of staff members would continue to collect data about the effects of the new procedures and a later session might be held to evaluate the progress of the new procedures.

Summary

A considerable amount of behavioral science research knowledge relevant to educational administration is now available, but little of this knowledge is transformed into effective practice. Some approaches to making research knowledge available to administrators have been the professional research journals, the expert consultant, the successful experimental program diffused from another system, and the development of knowledge from within the school by small-scale action research programs or by survey data feedback projects. Even with these attempts, the gulf between knowledge producers and knowledge users in education still is wide and all too seldom bridged.

Three problem areas in connecting knowledge to practice in educational administration can be described. The first problem point occurs in the social relationship between the behavioral science researcher and the educational administrator. A condition resembling the in-group, out-group phenomenon found in studies of prejudice seems often to describe researcher-administrator relations. Stereotypes and antipathies are reinforced by the lack of two-way communication and hostility is increased by challenges of each other's intelligence and status. Several vicious cycles of negative interpersonal relationships involving inadequacy and withdrawal as well as hostility and resistance can characterize the researcher-administrator relationship.

A cluster of four psychological processes accompanies these difficulties in interpersonal relations. Both parties selectively perceive aspects of the other's behaviors to the detriment of the relationship. Moreover, distortions of memory, especially concerning the feelings of the other, and a tendency to place low value on each other's work characterize the relationship. Finally, the self-concepts of both the researcher and the administrator can be seriously threatened by the possibilities of collaboration.

If an effective and viable relationship is to be formed between researchers and administrators, we must face the psychological issue of linking knowledge and practice within the administrator's personal framework. Skillful administrative action requires more than correct intent and practical research knowledge. The social skills of administration require considerable practice before they are spontaneously available for use in natural situations. Internal psychological linkages between knowledge and practice are made more difficult for the administrator by role expectations others hold for him, by his own division between the "role of administrator" and the "role of student-learner," by the lack of clear and operational educational goals, by his lack of motivation to try something new, and by presentations of the research knowledge in strictly verbal ways in moderately threatening surroundings.

The third problem point in connecting knowledge to practice concerns the administrator's making effective use of new practices by matching them up with appropriate situations. Utilization of research knowledge often breaks down when new behaviors are used indiscriminately in diverse situations. Goal ambiguities and the role expectations of others again serve to inhibit the appropriate uses of new behaviors. Such psychological processes as the tendency to strive for subjective consistency, rigidity, and closed mindedness sometimes deter the flexible uses of new practices.

More time and energy need to go into building connections for transforming knowledge into practice in educational administration, especially in regard to these social psychological factors. Federal money is being used in R & D centers, Regional Laboratories, Dissemination Centers, and ERIC projects to facilitate the knowledge utilization process. The National Training Laboratorics and related organizations are concerned with overcoming the interpersonal and psychological barriers to utilizing behavioral science in social practice. Social psychology, in general, may have a great deal to offer in bringing researchers and administrators together in worthwhile communication.

Trust, openness, and some attraction need to be established between

researcher and administrator before utilization will occur successfully. Trust can be increased through participation in cooperative activities in which the intentions for entering into a relationship and mutual expectations are publicly discussed. Each must be open for feedback concerning violations of expectations. Both parties should be able to benefit from the project and, wherever possible, both should agree upon the superordinate goals they share. Public discussion of restraining forces that impede collaboration should help to increase openness and attraction in the relationship.

In building psychological linkages between knowledge and practice within the administrator, the administrator's values and goals should be more clearly and operationally defined. He should be encouraged to simulate his learnings through role-playing and then try out the new practice in the "real" setting, while still being able to discuss his try-out with other administrators. For many new practices, the entire staff of a school or school system should be involved because of the strength of normative patterns and interpersonal expectations. Furthermore, to behave effectively in various situations, the administrator should receive training in giving and receiving feedback, in diagnosing social situations, and in achieving flexibility and open-mindedness.

Aspects of training events for accomplishing better knowledge utilization should be based on these social psychological assumptions. Events of one such training program would include interpersonal sensitivity training, presentation of some limited set of behavioral science research findings, teaching diagnostic skills for measuring aspects of the behavioral science domain under discussion, thinking of new practices which spring from the research knowledge, role-playing the new practices, receiving feedback from observers and trying the practice again, trying the practice in the real setting, having supportive group meetings with the administrators who are trying new things, and finally diagnosing and getting feedback from others in the natural situation on how the new practice is working out.

A second training program would include organizational development training involving the entire faculty of a school. The program would include the presentation of some behavioral science research to the staff, diagnostic skills in collecting data about the issues from fellow staff members, thinking of new procedures that arise from the research knowledge, trying-out the new procedures, and finally diagnosing and getting feedback from colleagues about how the new procedure is working out.

The need is great for a technology of transforming behavioral science knowledge into effective practice in educational administration. This

paper has been addressed to only one aspect of that technology, the social-psychological. Perhaps it will stimulate others to think and act more deeply, thoroughly, and effectively about some of the issues involved.

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CHAPTER
7

Keith Goldhammer

Implications for Change in Training Programs

Because mine is the last presentation of the conference and because it is related to the "training" programs in educational administration, the implication is that I will synthesize the ideas formulated in the preceding scholarly presentations and construct some consistent approach to the training of educational administrators—an approach which can, then, become the model for solving all our woes in the future.

If a Flexner Report for the preparation of educational administrators has been written, it has not, as yet, been discovered. I strongly suspect that if Flexner wrote his report today for either educational administration or medical education it would very likely *not* produce the revolution that it did some fifty or sixty years ago, nor even be regarded as a model of what the sensitive and perceptive scholar might do to apply his knowledge and expertise toward the solution of a very difficult, if not critical, educational problem.

An analogy might be made between the dinosaurs of the Mesozoic age and the educational institutions of today. Like dinosaurs, educational institutions are behemoth organizations, not too well adapted to their environments and lacking the internal self-adaptive mechanisms necessary for survival in a rapidly changing environment. The channels for internal signal transmission have become so imbedded in obstructive

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tissue that the tail wags long after the reason for the origination of the signal from the brain has disappeared. Instinctively, like any organism or organization, the educational institution is dedicated to survival, but the complexity of its ill-conceived structure is so great that it cannot mobilize even a small portion of its energies to achieve the coordinated effort that survival necessitates.

These remarks, then, are not designed to produce a revolution in the training programs of educational administrators, nor are they so much a recapitulation of the ideas presented in the foregoing papers as they are a stream of consciousness of the writer resulting from his reading and rereading of the papers.

Training Programs for Administrators: Fact and Fantasy

Lack of specificity

Galbraith (1967) has pointed out that the most important consequence of the application of technology to the practical tasks to which it applies is enforcing the division and the subdivision of any task into its component parts. He states that there is no way that organized knowledge can be brought to bear on the production of an article as a whole. First, the productive process has to be broken into its component parts. Then, specific tasks have to be designated for the manufacture and assembly of specific parts. It is at this point that technological knowledge can be employed. The metallurgist can be called upon to provide the correct temper of steel for a particular part, and chemical engineers can determine the grade of fuel that will be needed for a particular function only after these specifications have been determined.

It seems that we have been guilty of erroneously thinking that we could apply the social sciences globally to educational administration rather than to the components of tasks, problems, and processes which comprise the content of administrative actions and behaviors. We have felt that sociology has had some relevant concepts, so we have said to the student of administration, "Take some sociology courses." The same holds true for other fields to which we have directed these students—political science, psychology, economics. These courses were designed to prepare people to be sociologists, political scientists, psychologists, and economists. Our most able and perceptive students of administration learned something from these fields, which they could apply to their tasks as administrators or professors of educational administration. Seemingly, they were able to select from the context of various courses some "gems"

which they felt were applicable to their problems and concerns as administrators. Others thought they had gained the degree of sophistication they needed to become social scientists and decided that as "basic researchers" or "theoreticians," they would achieve greater academic prestige They climbed "cloud nine" with the scientists and cried "Forget the current crop of administrators! They can't be saved anyway because they haven't read Talcott Parsons, Robert Merton, or even Theodore Newcomb. They can't rotate matrices, perform the other functions associated with factorial analysis, or even explain the nature of co-variance. Obviously such dolts wouldn't make good school administrators."

The disenchantment of students

I think we have come to the point where we have to face the simple fact that for most of our administrators in training, or even for our graduate students destined to become professors of educational administration, the training experience which I have described has been both dysfunctional and disillusioning. Certainly there is evidence of disillusionment among many students who have returned to universities to improve their competencies as school administrators. Back on the campus the social scientists convince these students that they are an inferior breed whose only hope for salvation is to retreat from the schools to the universities where, presumably, they can spend their lives in "basic research in administration" or in developing "a new theory of educational administration." The bankruptcy of this point of view becomes quite evident when one considers the fact that those in educational administration who *talk* about the theories and concepts of the social sciences and the need for greater amounts of research *do* precious little research or theory building, if any at all.

The research to application myth

If I adequately perceive some of the suggestions arising out of these papers, I am impelled to doubt that in a practical profession based upon human relations, a progression is or can be from research to development to use. There is little to be gained from the shotgun approach of just searching for new knowledge with the hope that somebody might follow in our footsteps to find some practical use for it. The search for applied knowledge begins, I believe, in the recognition that some serious tensions arise as a result of being faced with a problem which is beyond the ability of present scholarship to solve. We search for that knowledge which will enable us to identify the cause and achieve the cure for cancer because

cancer is a killing, pathological state, and we can save lives to the extent that we can cure it. We discovered the Pill, not because we were curious about the environment and somewhere, somehow, some basic research got together with the practical problem, but because there was a conscious effort to find in the Pill a solution to a very serious social and physical problem that man, to survive healthfully and happily in this world, needed to solve.

Basic research starts with theoretical propositions which are essentially irrelevant to the practices in the field. It leads to the construction of ordered systems of data which help to explain and interpret the essential phenomena of the world and their interrelationships, but which do not, in themselves, solve practical problems. Our approach for the past 18 years in educational administration has been, in effect, to search blindly for any theoretical knowledge that we can obtain, and having found some, to exclaim, "Now let's find out what it is good for!" I suspect that we have discovered that this approach is good for producing hypotheses to stimulate further research, but it does not yield much that would help us to prepare educational administrators to deal effectively with the real problems that confront their school districts.

I would suggest that a more reasonable progression in the chain than the one which proceeds from research to development to use is that which goes from experience to experimentation to diagnosis, to research, to application, to further experimentation, and so on, constantly recycling the process.

The products of social scientific knowledge

A part of our problem lies in how we define the product of our knowledge accumulation in education. Industry can go to science with a definite need—"Find us a tempered steel that will stand so much heat when reentering the atmosphere." The product of engineering physical knowledge into a technology is almost always *specific.* It can result in a product, a device, a mechanism that will solve some problem. It is visible; it is tangible; it is concrete.

But, the product of engineering social scientific knowledge into an administrative or an educational technology is not specific. The product might be *a concept* which does not tell us what to do when confronted with a specific phenomenon, but merely provides us with some diagnostic power so that we can isolate the relevant variables which are present in a situation. In other words, it may only give us a knowledge that we need to separate the "ground" from the "field," so that we know what factors within the field are pertinent to the situation with which we must deal.

Or, the product might be *a strategy of action* which enables us to assess the probability for producing certain consequences through various alternatives of action, thus enabling us to select the strategies which offer the greatest promise for producing the consequences that we desire.

Or, the product of the engineering of the social sciences into an administrative technology may be a *generalization* which enables us to isolate certain factors which are significant in the specific social situation and which we must take into consideration in formulating strategies. It may be nothing more than a generalization that enables us to organize previous experience and, thereby, to find some security in knowing that there is some likelihood that our interventions will produce desirable effects.

This point of view is certainly consistent with Gouldner's statement that the social sciences today provide few, if any, validated laws or broad generalizations. He states:

> There seems to be no close correlations between the devel pment of generalizations by the pure disciplines and the multiplication of opportunities for and varieties of applied sociology. . . . Any metaphor which conceives of applied social science as the offspring and the basic disciplines as parents is misleading. It obscures the point that applied sciences often contribute as much to pure science as they received from it. (Gouldner, 1965, p. 7.)

He adds that an applied science cannot be regarded as entailing a simple transfer of either the established propositions or the concepts of pure science to practical purposes.

The problem is, I believe, that in the field of educational administration we have been seduced by a new positivism We are being guided by the quantitative scientists whose search for precision and exactitude does not adequately reveal the unknowns which exist in a human field where actions must be taken on the basis of partial knowledge and where an understanding of probabilities is the greatest security that the practitioner can hope to achieve. This is neither strange nor without precedence. The practitioners of other professions who use the knowledge of their fields do so, not as basic researchers nor as applicators of basic research, but as clinicians. This is the way the physician works; this is the way the psychiatrist works; this is the way the human relations consultant works; this is the way the clinical psychologist works. As does the school administrator, they too, have some unbridgable gulfs separating them from the theoreticians of their profession. I submit that the preparation of the school administrator as the clinical student of organization or the clinical student of society is a far more viable model for the preparation of the educational administrator than is the model in which the training effort

is directed primarily toward bringing him into proximity with the findings of the basic research.

The School Administrator as a Clinician

Many years ago Alfred McClung Lee (1955) suggested this approach. He called upon sociologists to open a new field in which they became the clinical students of society, applying their knowledge and experience gained as sociologists to the identification of the problems of society and to the search for solutions to the problems.

The needs and requisite skills of the clinician

I feel that our training of school administrators must be so oriented that the school administrator becomes the clinician who can:

1. understand the social functions of education so that he can diagnose both healthy and pathological states and relationships between the schools and the society of which they are a part;

2. understand the nature of the organization in which he works so that he can identify both the points of friction which need to be remedied and the points at which there is the greatest potential for accomplishing new and better means of operation;

3. understand educational objectives, methods, and processes so that he can identify the extent to which the school organization is achieving its desired objectives, or failing to achieve them, so that he can locate the places within the organization where energies are being dissipated and where they are being utilized to the fullest advantage; and

4. understand human relationships and skillfully utilize the dynamics of group processes so that an adequate and effective performance of the human beings within the school organization can be achieved.

Based on these four kinds of needs which the clinician administrator of school organizations must satisfy, I think there are four keys to his preparation.

First, he must have knowledge of the school organization—how it functions, how it achieves healthy states of performance, the pathologies that prevent its healthy functioning, and how it relates to the society of which it is a part. He must also have knowledge of the technology of educational processes and of the technology applied to the problems of mobilizing, coordinating, and directing associated human endeavors toward the accomplishment of specific organizational objectives.

Second, he must have skills of diagnosis. Diagnosis is not a precise art, although we may hope that through its use we will be able to make it more precise, more exact, more definite than it now is. Skillful diagnosis requires selection of information that is relevant to the problem to be solved. The diagnostician must have the knowledge that will enable him to determine the relevance of his data and to interpret these data to describe the state of functioning of the organization and the objectives toward which it is striving.

Third, the clinician must be able to apply existing knowledge and relevant concepts to the data which he has collected so that he knows what to do with the data, what they mean to him, and how he can use them effectively to achieve his ultimate objective.

And fourth, the clinician needs to know what strategies he can employ after an interpretation of the data has enabled him to identify the inadequacies of the organization and the means by which they might be overcome. As a consequence, he should have the basis upon which he can prescribe the interventions necessary to achieve healthy and more effective states of operation. Basically, the clinician of the school organization today needs to know what strategies he can use, given certain existing conditions, that will enable him to change such existing conditions if necessary and implement programs which are purposive and functional.

Some specific applications

If the school administrator is to be educated so as to use knowledge effectively in his decision-making, it is apparent that the structure of preparatory programs must be drastically overhauled. Implicit in the entire discussion of this conference is the fact that the administrator who has been prepared to be "a perceptive generalist" is no longer a viable model for the preparation of the administrators of the future. Specialization in the field of educational administration is imperative. An individual must be prepared for the different roles that he will be required to play in the performance of specific types of responsibilities in school organizations. Before adequate preparatory programs can be devised, an exploration must be made of the implications of contemporary trends in the world of technology as well as in the realm of knowledge production. The rapidly increasing volume of available knowledge probably cannot be effectively utilized exclusively by computerized techniques. The result of the automated data processing techniques may well be a rapid movement of decision-making to the top echelon of the administrative hierarchy accompanied by the elimination of many of the tasks of middle management. Through the use of computers, the top echelon will exercise

greater control over management, but undoubtedly will leave greater authority for instructional development and improvement to middle management. The new knowledge and skills needed for program management and development may be far different from those which are needed for the strictly housekeeping chores which again may have to become divorced from the problems of instructional leadership. But in addition to this, the very nature of the school organization will have to be adapted to the changing requirements of the new technology and the differing structure of relationships and expectations between the schools and the communities they serve.

Instructional programs to prepare individuals to be the "linkages" between the school organization and the knowledge production staffs of universities and research laboratories must be different from those needed by principals, supervisors, and curriculum developers who work directly with teachers and other instructional aides to implement the programs which have been devised. A vastly different structure of preparatory programs than now exists is imperative to prepare individuals adequately for the diverse administrative leadership and program development responsibilities which are indicated.

Second, the essential elements of the preparatory program for administrators with various levels of responsibility must be clearly defined. The needs of the contemporary educational administrator and leader cannot be met by having him take "courses about . . ." The components of the needed administrative preparatory program today include: knowledge-building experiences, skill-building experiences, diagnostic experiences, experiences in the application of knowledge and data to concrete situations, experiences in the interpretation of knowledge and its "reduction" for the specific application to discrete problems and communities.

The individuals who are preparing to become the educational leaders, the program developers, the diagnosticians, and the implementers need experiences in the formulation of strategies based upon knowledge and their diagnosis of the needs of individuals and groups, as well as in the application of their strategies of change to the situations which they wish to alter. I suggest that, in the future educational program for administrators, less than a third of the time be spent in knowledge-building activities and more than a third be spent in laboratory-type situations where students will have experiences which build refined skills in diagnosis, application, interpretation, and strategy-development. The remaining time in the preparatory program probably should be spent in seminars, both formal and informal, in which the students and their guides have an opportunity to compare the results of their diagnosis and treatment of

particular situations and to evaluate their degree of success in achieving the goals which were established.

It is apparent that the knowledge needs for this type of preparatory program are extremely great and the time involved in producing the diagnostic skills will necessarily be extended. The educational demands and the time factor necessitate the identification of administrators quite early in their college careers so that programs of instruction can be geared to their acquiring that knowledge which will form the basis upon which their skills as diagnosticians and applicators will be developed. Unquestionably, the fields of the social sciences and the humane arts must become the recruiting ground from which will come the individuals who will be participants in the administrator's preparatory programs. Not all of those who enter the program need to have experience as classroom teachers. The relevance of teaching in the prior experience of administrators must be more thoroughly explored in the future.

Third, departments of educational administration should extensively explore the research in the field of social psychology to determine the kinds of experiences administrators need to develop the attitudes and behavioral characteristics essential for successful administration. Administrative preparatory programs in the past have sought to help the individual obtain some knowledge about the field of education and about administrative processes and techniques. The administrator preparation program of the present and the future must be designed to change behavior, change perspectives and modify values so that the student has both the skills and the perspectives necessary to deal effectively with society's problems through the educational process.

Fourth, preparatory programs must be carefully designed to give students opportunities for involvement in actual situations and for participation in data collection and diagnosis and in strategy development and implementation. This involvement and participation of students must be subject to careful observation and evaluation, not necessarily by the same individuals who have developed the strategies, but by those who are able to help the students evaluate their own performance of essential activities, which, at a later date, they will have to perform on their own professional responsibility. The clinical internship is certainly needed as the core of the administrative preparatory program, and such an internship must be viewed as one in which the intern's behavior as well as his diagnosis and strategy are carefully scrutinized. Through personal conferences and seminars, he should be helped to see the kinds of images that he creates in the minds of other people and the kinds of consequences that result from his personal interventions into educational situations.

Fifth, clusters of educational experiences (rather than courses) should be developed specifically around areas of administrative tasks and responsibilities and specific applications should be made of knowledge derived from the social sciences, technical knowledge, and the humanities. These clusters need to delineate (among other concerns) the nature of the environment with which administrators must deal, the characteristics of specific phenomena within the environment which administrators need to control in order to achieve the consequences that they deem desirable, the patterns of both individual and group reaction to interventions within the framework of these phenomena, and, finally, the alternative administrative strategies.

Sixth, universities with programs in educational administration must recognize that the knowledge, skills, and attitudes of the practicing administrator will be modified by the experiences which he has in the field. Some will certainly be modified for the better, but many will be modified in forms that help them to become "professionally disabled" to deal effectively with the educational problems which confront them. New knowledge, new techniques, new interpretations of needs will constantly arise, and the individual who is faced with the necessity of constantly fighting the educational battles on the firing line will need opportunities to recoup his professional capital and to recharge his professional sources of energy. This means that the professional preparatory program is only a part of the total responsibility of the preparatory institution and, possibly, in the future it will have to become the smaller part of its responsibility. Every individual engaged in a professional career needs regular and continuing participation in various forms of in-service education. Although neglected at the present time by most of the preparatory institutions and related agencies, the continuous in-service education of administrators is one of the most imperative needs for the revitalization of education in our society. To provide those experiences which can effectively assist the trained professional to modify his behavior, to obtain the new knowledge which he needs, and to build new skills based upon contemporary technology is probably the greatest challenge facing the field of educational administration and all of its institutions and agencies today.

In conclusion, the perspective which I have presented here suggests that the administrator of the future can be adequately prepared to perform his essential functions by making him neither a student of basic research nor "a perspective generalist." He must be specifically and technically trained to be the clinician of human relations within the educational organization. He must be the clinician who can deal effectively

with educational programs as devised to achieve specific educational objectives. He must be prepared to deal effectively with the problems of analysis and interpretation as well as with the formulation of remedies.

The needed changes in education will not take place because individuals are exhorted to change. Individuals must be dissatisfied with current practices, programs, or conditions before they will be motivated to produce the kinds of changes that are needed to make education the vital agency that it must be both for the human beings growing to maturity and the total fabric of society. Perhaps the root of our problem today is that our administrative preparatory programs have been socializing programs which have made individuals too satisfied with the *status quo*. Most likely we could accomplish our major objectives more readily if we were to help those who are a part of our preparatory programs become dissatisfied with what is happening, and then proceed from there.

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