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AUTHOR Trapp, Mary
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ABSTRACT

A discussion providing a background sketch of theories and research specifically about, or pertaining to, the subject of knowledge utilization in the public education system in the United States is presented. The problem is defined as the question of how and why existing information comes to be considered "useful" by practitioners and how it is subsequently applied by practitioners. In the literature that has been generated in the area of educational diffusion, adoption and utilization of information, three basic approaches have been isolated: the research, development and diffusion perspective, the social interaction perspective, and the problem-solver perspective. The dominant perspective has been the research, development and diffusion model. Research on the subject of information utilization is described as loosely organized, university-based, individually directed, theory oriented, committed to experimentalism, conducted primarily by persons trained in a psycho-statistical tradition, and a part-time pursuit. The point is made that when considering the role of media in education, one should distinguish between the commercial mass media and media used as teaching devices in the classroom. The final conclusion of this review is that the communicational perspective of the present study finds a fair amount of theoretical and research support in the extant literature on knowledge utilization in education. (Author/CK)

THE UNIVERSITY OF IOWA
IOWA CITY, IOWA 52240

Center for the Advanced Study of Communication
Area 319: 353-5414

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Originator: Mary Trapp, Graduate Research Assistant

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Distribution: Project Associates*

Research Assistants*

NCEC Officials

Practicum Participants*

Consultants

Contributors

Public Inquiries

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PURPOSE AND STRUCTURE OF PAPER

The purpose of this discussion is to provide a background sketch of theories and research specifically about, or pertaining to, the subject of knowledge utilization in the public education system in the United States.

The paper is organized in sections in which, first, the problem is defined; second, significant theoretical approaches are presented; third, research is discussed; fourth, media theory and research as it pertains to the process of knowledge utilization in education is presented, and fifth, the study of which this paper is a part is placed in the context of existing theories of knowledge utilization.

Any attempt to discuss theories and research in a subject as ambiguous and wide-ranging as knowledge utilization must be less than comprehensive. This paper does not presume to be definitive; it presents, at best, a sketch based on the author's subjective decisions as to theories and research significant to the study of which this paper is a part. Readers interested in the subject and who wish a more comprehensive literature review are directed to Ronald Havelock's Planning for Innovation Through the Dissemination and Utilization of Knowledge.[1]

STATEMENT OF PROBLEM

In its simplest form, the problem of knowledge utilization in education is the question of how and why existing information comes to be considered "useful" by educational practitioners, and how it is subsequently applied by practitioners. In much of the literature on the subject, "existing information" is narrowly defined as "existing scientific research findings."

An underlying assumption of the entire question seems to be that such

information should be "used." In Havelock's words, there exists "... the growing expectation on the part of industrial executives, government leaders, and the general public that most, if not all, of our storehouse of scientific knowledge should be useful to man."[2]

Utilization of existing techniques, tools, and ideas--of "information"--has a relatively short but productive history of study. The bulk of the literature has been generated in the fields of educational innovation, agricultural innovation, medical information dissemination, and technology utilization, the latter with emphasis on military technology.

Subsumed under the term "knowledge utilization" in education are such diverse areas of concern as application of research, diffusion of research information, educational change, educational innovation, creative teaching methods, dissemination of information, adoption, utilization, development, production, evaluation, and technical and technological skills. All have something to do with knowledge utilization in education, making the concept very difficult to define. In this paper, the term will be understood to mean adoption of existing techniques, tools, information and ideas by some educational practitioner. The author is aware that this may be too narrow an understanding, for it presupposes the existence (or production) of information and the existence of a dissemination structure, that is, of an information system.

Knowledge utilization in education cannot be understood apart from its context. Accordingly, the informational structure of the American educational system will be briefly examined. Who produces the information in the system; who disseminates it, and who uses it? Two levels should be distinguished. First, there is the level at which the entire environment is the information source, the teacher is the disseminator, and the student is the adopter or

user. More to the point of this paper, however, is the level at which educational researchers produce scientific information, dissemination is accomplished through various information systems, and educational practitioners utilize the information to change (generally, with intent to improve) the teaching of children.

At the second level discussed above, a fact that becomes apparent is the complexity of the American formal educational system as an "information" system. Sam D. Sieber[3] recognizes five primary sources of educational information: university-based research units, regional educational laboratories, research units within state departments of education, research units within local school systems, and private testing and research organizations.[4]

Thomas D. Clemens recognizes three primary audiences for such educational information, specifically, other researchers, educational decision-makers and practitioners, and the general public.[5] These audiences are provided with information about educational research through a dissemination network comprising professional associations and organizations and their journals, other publications, and conventions; universities and their publications, extension services and instructional activity; government agencies, including local school districts, state education agencies, and the federal government with its various information services and administrative agencies; private publishers; foundations, and the mass media.

This dissemination network includes the university-based educational research and development (R&D) centers and the regional educational laboratories administered by the Office of Education. Generally, the R&D centers are concerned with production and refinement of new information in education, while the educational laboratories are concerned with application of new information to existing educational situations. In addition, the Office of

Education operates the Educational Resources Information Center (ERIC), an information system which receives information through a network of clearinghouses, makes it available to researchers and practitioners who can learn what is in the system through either hand or computer search techniques, and offers either hard copies or microfiche copies of the information to users.

Mention of the R&D centers, of the regional labs, and of ERIC, suggests that efforts have been made to implement a national system of information dissemination which will allow educational practitioners to find out about and use the products of educational research. Nevertheless, sentiment is that the system is not achieving the results its planners envisioned. In large part, this may be due to the nature and structure of the American educational system. Sieber remarks, "Because of the pluralistic nature of education in the United States, a single, monolithic educational research information system has not developed, nor is it likely to develop."[6] Many explanations of the knowledge utilization process in education have been presented, however, and a review of the major ones may suggest why the American educational system processes information the way it does.

THEORETICAL APPROACHES

In educational research, the significant early theory and research bore the mark of one man, Paul Mort.[7] Mort's work was in the area of diffusion research. Time, that is, the relatively large amount of time required for the diffusion and adoption of an idea within the educational system, was a key concept underlying his research. Mort gave credibility to the concept of time lag in educational diffusion. He wrote:

> Following an important discovery such as the one made at the turn of the century--that the theory of formal discipline is untenable--we may expect a long adjustment period characterized by thousands of inventions of know-how designed to put the insights into operation. The latter part of this period will be more prolific than the early part. It is out of the accumulation of inventions that new composite inventions or designs emerge.[8]

Mort posited a four-stage diffusion and adoption process, beginning with insight into a need, introduction of a way of meeting the need, diffusion, and adoption.[9] He gave due weight to environmental pressures on the school system. He argued that the best schools of the future could be discovered piecemeal in the operations of the schools of today and that "The golden strand among the bundles of haywire about us would appear to be adoption of responsibility by the school that all children shall learn, and the giving up of the guiding principle of offering opportunity that was adequate for the 19th century.[10]

Mort's influence and his emphasis on environmental influences are recognized by Richard O. Carlson,[11] who also recognizes a shortcoming in Mort's work. Carlson writes:

> . . . the study of the spread of educational practices bears the mark of one man. The late Paul Mort and his students seemed almost to have cornered the market on educational diffusion studies. This last feature has, however, apparently permitted a . . . very important characteristic of such studies: an implicit assumption that characteristics of chief school officials are unimportant in explaining rates of adoption of innovations.[12]

What Mort started, many have continued. In the literature that has been generated in the area of educational diffusion, adoption and utilization of information, Havelock has isolated three major paths of thought about, or three basic theoretical approaches to, the knowledge utilization process. His categories will be adopted here and an attempt will be made to discuss briefly representative educational theorists of each approach. The three approaches as defined by Havelock are the research, development and diffusion perspective, the social interaction perspective, and the problem-solver perspective.

Of these three theoretical perspectives, the dominant one has been the research, development and diffusion model (see Model 1, Appendix A). This model reflects stimulus-response assumptions and encourages research emphasis on the producer and "controller" of information. Reasons for its dominance are many.

It builds on the early work in agricultural diffusion and thus has a credible scientific base, even though, as Sieber argues, the unique characteristics of the educational system indicate that research in other fields does not necessarily transfer to the educational system.[13]

In an admitted over-simplification, this perspective is compatible with the American bias toward "unphilosophical pragmatism,"[14] which assumes that provision of information and ideas is sufficient to insure utilization, since rational men will seek out the best information available for any problem. This assumption is supported by the social communication theory expressed in the formula of the open marketplace of ideas, which is manifested in American political-legal institutions.

The linear, sequential nature of the research, development and diffusion perspective is supported, too, by the more technical ideas of traditional communication theory, including the linear, mathematical Shannon-Weaver model, which uses source, message, channel and receiver as its dominant elements, and the Lasswellian verbal formula of who says what to whom in which channel with what effect. In addition, the perspective reflects a mechanistic bias in American society which encourages emphasis on technology. The roots of this may be found in the British philosophical development of laissez-faire individualism. The philosophy, developed during the rise of industrialism and transplanted in America, assumes an essentially mechanistic, Newtonian view of the universe.

The support for this theoretical perspective is thus impressive, but it suffers one flaw: it doesn't seem to satisfactorily explain the phenomenon of knowledge utilization. If the justification and role of theory is its broad explanatory and predictive power, and its ability to suggest relationships, a theory which assumes rational action as the human norm would seem to ignore significant elements of human experience. Havelock says of the RD&D perspective:

> It seems to be a particularly popular and appropriate model for dealing with D&U issues at the macrosystemic and policy levels . . . because it subdivides the knowledge flow system neatly into different functional roles which exist within different subcultures (e.g., the research community, the product organizations, the practitioners, the consumers). It does appear to supply much of the rationale for current policy planning in the U.S. Office of Education.[15]

Representative proponents of the research, development and diffusion perspective in education are Henry Brickell and Egon G. Guba. Brief descriptions of their approaches will be presented below.

Brickell,[16] based on his research with the New York state educational system, developed a three-part model of the change process in education. The three phases are design, evaluation, and dissemination of innovations. In Brickell's words:

> Program design is the translation of what is known about learning into programs for teaching. The ideal circumstances for the design of an improved instructional approach are artificial, enriched, and free.[17]
>
> Program evaluation is the systematic testing of a new instructional approach to find what it will accomplish under what conditions. The ideal circumstances for the evaluation of a new instructional approach are controlled, closely observed, and unfree.[18]
>
> Program dissemination is the process of spreading innovations into schools. The ideal circumstances for the dissemination of a new approach through demonstration are those which are ordinary, unenriched, and normal.[19]

Underlying concepts in Brickell's model of the educational change process are the essential stability of the system and the harmony, or interdependence, of the system with other parts of the society. Change, thus, is the exception rather than the rule, but failure to change is not totally the product of external societal pressure. Brickell says, "The public is not an anchor holding back an eager profession. Community expectations and professional ambitions are usually in reasonable harmony with each other."[20]

Guba[21] is a second major proponent of the research, development and diffusion model. He posits a four-category theory-research continuum, consisting of research, development, diffusion, and adoption.[22]

For Guba, research comprises depicting, relating, conceptualizing and testing; development comprises depicting, inventing, fabricating, and testing; diffusion comprises telling, showing, helping, involving, training, and intervening, and adoption comprises trial testing, installing and institutionalizing.[23] Central to Guba's conceptual framework is the assumption that research and practice are two distinct activities within distinct communities, and that middlemen have to be trained to connect the two.

Though the research, development, and diffusion perspective on knowledge utilization may be faulted for its mechanical, linear bias, criticism of it must be qualified, as Havelock recognizes:

> In criticism, the RD&D model can be said to be over-rational, over-idealized, excessively research oriented, and inadequately user oriented, but because it has been laid out so concretely by Guba and his colleagues, it gives other educators something to shoot at figuratively as well as literally. [Dr. Frank] Chase, for example, has suggested that Guba and company may have been most useful to education in arousing colleagues to come forth with alternative conceptualizations.[24]

While the research, development and diffusion model concentrates on the knowledge producer, the second major perspective, the social interaction perspective, concentrates on the relationships between producer and user (see Model 2, Appendix A). This model, based on anthropological, sociological and social psychological thought, has contributed to educational theory the distinction between formal and informal communication channels, the concept of the opinion leader, and the concept of the reference group as a major determinant in adoption and change of attitudes. It encourages research emphasis on the organizational aspects of the educational change process.

Representative theorists in this perspective are Everett Rogers,[25] Carlson, and Mort. Rogers is most widely known for his work in rural sociology, but he has also given some thought to the knowledge utilization process in education.

The very fact of his background in rural sociology lends credibility to Rogers' discussion of the possible inapplicability of such research to education. He notes that " . . . we have tended to view schools as if they were farmers, innovation-wise."[26]

Rogers gives needed emphasis to the inhibiting effect that traditional concepts and research can have on conceptualization of the knowledge utilization process. This is evident in his discussion of the inapplicability of rural sociology to education. ("Strange," he writes, "that the study of innovation has itself been so traditional."[27]) Rogers would change the educational research emphasis <u>from</u> the process between schools <u>to</u> inspection of what goes on within each unique school system, and would adopt the methodologies of relational analysis and structural effects. Using these methods he would study diffusion effects variables, communication variables, social system variables, and consequences variables.[28]

Rogers is especially interesting because of his emphasis on the communicational nature of the knowledge utilization process. ("There is hardly any need at this point to discuss the importance of communication in the diffusion process. Diffusion <u>is</u> a communication process."[29]) A central concept in Rogers' work is that of stages of adoption over time. In a social group the continuum progresses from innovators to early adopters, early majority, late majority, and laggards. Rogers conceives of stages of adoption within the individual, also. An individual progresses from awareness to interest, evaluation, trial, and adoption.[30] This concept is compatible with the basic conceptualization of time and time lag as developed by Mort.

Carlson conceives of the diffusion process as involving interaction among people. He takes issue with theoretical emphasis on environmental determinants to the exclusion of consideration of influences of individual interaction through

informal communication channels. At the same time, however, he avoids the overly-individualistic idea that environmental aspects are of minimal importance. The emphasis is on the relationships between individuals within systems. These relationships may constrain action but such constraints can also be changed or disregarded by the individuals involved. Carlson's interaction perspective can be seen in his statement:

> Social structure involves the relations that exist among people. It is defined in terms of the distribution and differentiation of statuses, roles, and patterns of interaction or communication among members of a social system. . . . the spread of new ideas takes place in a social network in which the act of acceptance by an individual seems to influence others . . . .[31]

Rather than conceiving of adoption as a phenomenon occurring to discrete individuals, Carlson tends to view it as a chain reaction with cumulative effect.[32]

The social interaction perspective of knowledge utilization in education emphasizes the relationships between participants in the system. It thus encourages a shift in research emphasis from the information producer, with the connotation of a producer-controlled system that such an emphasis supports. Havelock suggests, however, that the social interaction perspective gives too little emphasis to psychological factors in the utilization process.[33]

The third major perspective defined by Havelock is the problem-solver perspective which is user-oriented (see Model 3, Appendix A). Based on psychological theory, it ". . . rests on the primary assumption that knowledge utilization is a part, and only a part, of a problem-solving process inside the user which begins with a need, and ends with the satisfaction of that need."[34] The problem-solver perspective encourages research emphasis on the psychological processes that lead to perception of a problem and to utilization of existing information or invention of information to provide a solution to the problem.

Representative theorists in this perspective are Ronald Lippitt[35] and Matthew Miles.[36]

Lippitt's psychological approach is evident in his analysis of significant differences between education and the fields in which most diffusion and adoption research has been done. Lippitt writes:

> . . . in education, I believe, most of the significant changes in practice imply and require some changes in the attitudes and skills and values of the practitioner in order for the change to be a successful adoption and adaptation. Typical change in agriculture--a new seed, a new insecticide, a new fertilizer--does not require any basic change in the attitudes and values of the farmer in order for him to be a successful utilizer of these innovations. . . . The same is true if one reviews most of the new industrial inventions, and the same is true of most of the new developments in medicine--that they do not require major value changes, attitude changes or skill changes on the part of the practitioners. Yet we find most new teaching practices require significant psychological changes and skill acquisitions by the adopter and adapter.[37]

The change process in education is conceived of by Lippitt as a seven-step process: the development of a need for change; the establishment of a change relationship; clarification or diagnosis of the client system's problems; examination of alternative routes and goals, and establishment of goals and intentions of action; the transformation of intentions into actual change efforts; the generalization and stabilization of change, and the achieving of a terminal relationship.[38]

Although Miles argues that an innovation may be initiated by either the receiver or someone outside the system, he focuses on the receiver-based processes necessary to bring about adoption. He describes four stages leading to the adoption of an innovation. These are design, awareness-interest, evaluation, and trial.[39]

Advocates of the problem-solver perspective have done much to minimize the disregard to the user which is a prime drawback in the research, development and diffusion model, but this perspective, too, suffers some shortcomings: ". . . first, it puts excessive strain on the user; second, it minimizes the role of outside resources; and third, it does not provide an effective model for mass diffusion and utilization.[40]

Havelock, who feels that all three of the dominant models of the knowledge utilization process have something to recommend them, attempts to draw together the best elements of the three perspectives in his linkage model (see Model 4, Appendix A). He writes:

> The concept of linkage starts with a focus on the user as a problem-solver. We must first consider the internal problem-solving cycle within the user . . . there is an initial "felt need" which leads into a "diagnosis" and "problem statement" and works through "search" and "retrieval" phases to a "solution", and the "application" of that solution. But as we see . . . the linkage model stresses that the user must be meaningfully related to outside resources.[41]

The discussion presented here has briefly considered four approaches to the knowledge utilization process in education: research, development and diffusion; social interaction; problem-solving, and linkage. Of the authors mentioned, none can be given adequate treatment within the scope of this paper. The necessary exclusion of many theorists is not intended to imply that their work is of no value. Rather, an attempt was made to describe representative theories which would suggest typical conceptualizations of the knowledge utilization process. The reader is directed to the Havelock study for a definitive treatment of the literature in the field.

A further qualification must be made. The perspectives presented drew from recognizable theoretical disciplines--the research, development and diffusion perspective largely from the empirical tradition of agricultural diffusion and rural sociology, the social interaction perspective from the fields of anthropology and sociology, and the problem-solver perspective most heavily from psychology. That conceptualizations based on other disciplines, such as history, political science, or economics, have not been presented here should not imply that such conceptualizations would not offer valuable insights into the knowledge utilization process in education. That they have not been presented merely indicates that the literature did not reflect strong concern with these disciplines.

RESEARCH

If the problem at hand is utilization of educational research by the educational practitioner, a brief description of the nature of educational research in the United States may suggest some incompatibilities between the research community and the educational system. (These incompatibilities may also be conceived of as the tension between pure and "applied" science.) Guba and John J. Horvat identify seven characteristics of educational research. It is loosely organized, university-based, individually directed, theory oriented, committed to experimentalism, conducted primarily by persons trained in a psycho-statistical tradition, and a part-time pursuit.[42] Changing the existing educational research system to make it more relevant to the practitioner may be one step in encouraging use of its products by practitioners.

Carlson provides an overview of the state of educational research in the areas of diffusion and adoption, noting that, while research in these areas is extensive, the areas ". . . describe only a very narrow slice of the world of change in education."[43] Carlson's definition of the diffusion process seems similar to this writer's understanding of the meaning of knowledge utilization. Therefore, the definition will be presented below and Carlson's conclusions about research into each part of the process will be reported. He notes that no single diffusion study considers all aspects of his definition, and that, generally, diffusion research tends to ignore channels of communication, social structure and value systems.[44] Carlson's definition is:

> . . . the process of diffusion [. . . the (1) acceptance, (2) over time, (3) of some specific item--an idea or practice, (4) by individuals, groups or other adopting units, linked to (5) specific channels of communication, (6) to a social structure, and (7) to a given system of values or culture.[45]

A primary problem with research into acceptance is the vagueness of the term, whose meaning can range from <u>first</u> use to <u>full</u> use of some item. Thus, comparability

of studies in this area is suspect. In addition, educational research has slighted the aspect of decision-making in the acceptance process.

Diffusion is a process that occurs over time, yet few studies have identified this part of the process. This is due partially to the poor quality of record-keeping in the educational system, which has forced researchers to rely on the recall of persons questioned. Early research measured amount of adoption rather than rate of adoption.

Innovations can be either practices or ideas, but educational research has concerned itself mainly with the diffusion and adoption of practices. Researchers are further hampered by the tendency of practitioners to modify or adapt new practices while adopting them. Carlson suggests, "The basic problem is that no one seems quite sure what are the relevant dimensions of an educational innovation. And no one has tried very hard to find out."[46]

Research into adopting units has focused on the local school system rather than on the individual teacher. The second common orientation of researchers into this aspect of adoption and diffusion ". . . consists of elements rather loosely connected to what might be called communication theory; notably the two-step flow of communications hypothesis."[47] Although researchers have defined the adopting unit as the local school system, most have ignored the fact that the local school system is a complex organization, and have not utilized organizational theory to any great extent.

Referring to the study of communication channels, Carlson remarks that ". . . overall the neglect of communication is rather awesome."[48] As he defines them, adoption studies presuppose communication but need not directly consider it, so Carlson classifies most educational innovation research as adoption studies. Diffusion, he suggests, can be conceived of as either process or product. Conceiving of it as a process would require research into how innovations spread

and would focus on communicational aspects, but most research has conceived of diffusion as a product. This product orientation in educational research encourages such findings as that diffusion occurs at different rates and that time lag exists, findings which Carlson describes as "virtually useless."[49]

Carlson's conclusion to the section on communication channels is of interest to the student of communication. He writes:

> . . . it is not, strictly speaking, until one is concerned with individual adopters that the questions pertaining to various uses of channels of communication become meaningful. School systems do not send, receive, nor fall under the influence of communications; only people do. As long as the school system is taken as the adopting unit and until attention is given to who plays what part within a school system in the adoption decision, the neglect of the part played by communication will continue. . . .[50]

Carlson notes that social structure has been ignored as decisively as has been communication, and for the same reason--that the school system has been taken as the adopting unit, but that social structure deals with relationships between and among people, not between and among school systems.

Research into the system of values or culture would give some basis for evaluating the relative worth of a given educational innovation in terms of the needs or desires of the people it will affect. Carlson feels that no educational researcher has considered this aspect of the adoption and diffusion process.

Given the extensiveness of the research in the area of educational adoption and diffusion, the more specific discussion of research will be highly selective and will emphasize the information-seeking behavior of educational practitioners. (A list of general conclusions drawn from research on research utilization is presented in Appendix B.)

A portion of the research done in the area of information-seeking behavior concentrates on the source of information. Two types of sources have been distinguished: first, personal, local, and informal sources; second, impersonal, non-local or cosmopolite, and formal sources. Generally, early adopters favor

impersonal, cosmopolite and formal sources, while late adopters favor personal, local and informal sources.[51]

In addition, it has been found that one's attitude toward the source of information affects one's judgment about the usefulness or validity of such information. Early adoption of scientific research indicates a favorable attitude toward the scientist.[52] In education, it has been found that practitioners tend to feel that scientific research is not relevant to their problems; therefore, the information it produces is not deemed very significant.[53]

Information seeking can be conceived of as search behavior, but it also can be exploratory in nature. Scientific information systems (of which ERIC is an example) are primarily designed for individuals involved in search behavior, but do not lend themselves to exploratory information seeking.[54] An interesting study, in light of the above, indicates that federally funded information programs are the information source least-used by educational practitioners.[55]

Although its applicability to education is questionable, an agricultural study has investigated the two-step flow of information hypothesis. The author posited that opinion leaders would seek and use more information from the mass media than those individuals they influenced, but the theory did not hold. Further, the findings suggested the conclusion that influential individuals sought and used more information from all sources than did non-influentials, but that they were not "gatekeepers" of information, since non-influentials did not obtain their information about new farming practices from the influentials.[56]

The thrust of Carl Rittenhouse's[57] study of the information needs of educational practitioners* is the inapplicability of most educational research

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*See Appendix C for Rittenhouse's compilation of the information most important to and most difficult to obtain by educational practitioners.

to the operational needs of practitioners. This irrelevancy may partially account for the tendency of practitioners to ignore such research, because of the nature of the problem-solving process. Rittenhouse writes:

> . . . it is often difficult for those concerned with change to specify information needs precisely or to locate, access, and obtain in suitable formats the information they may have determined to be necessary. The tendency, therefore, is for most individuals to make direct and informal contact with friends or others in the field whom they believe to be knowledgeable regarding the area of interest. Information searchers are particularly eager to obtain direct data on experience from districts similar to their own.[58]

This suggests two basic incompatibilities between the research community and the educational practitioner. The first is an apparent tendency of researchers to assume that the educational process corresponds to the rational, logical, step-by-step problem-solving methods of scientific research. The problem-solving process of educational practitioners is not analogous to this orderly process, for educational problem solving requires immediate decisions. These decisions often must be made on the basis of inadequate information if for no other reason than lack of time to gather more complete information.[59] In addition, it has been suggested that the concept of logical sequence is not necessarily applicable to the problem-solving process.[60]

The second incompatibility is the apparent lack of concern for, or lower prestige of, applied science. Practitioners may find it hard to understand the technical language and methods of pure research, and harder still to decide how it applies to their unique situations and problems. As Launor Carter points out:

> Traditionally, the researcher has taken the position that if he publishes his results in the formal scientific literature he has discharged his responsibility. From the evidence cited it would appear that the formal publication of new findings does not by any means assure that the results will be expeditiously translated into a useful development.[61]

The responsibility of the information producer to consider or anticipate the needs of prospective information users is an issue that cannot adequately be

treated here. Nevertheless, it suggests that the ethical implications of scientific research cannot totally be dismissed from a discussion of knowledge utilization.[62]

To summarize the discussion of research findings, then, it seems that the formal organization of the research community in the American educational system is a highly individualized, psycho-statistically and experimentally oriented enterprise which tends to value "pure" research. It has produced a voluminous body of information about the knowledge utilization process and other aspects of educational change, but has tended to ignore the aspect central to the present study, that is, communication. It has been found that educational research is not a significant information source for the educational practitioner, who tends to seek needed information through informal communication channels, in part because educational research is not operationally oriented and so seems irrelevant to him.

A more fundamental problem was suggested by Rittenhouse, i.e., that a person seeking information does not always know what information he needs, suggesting that a priori research is less useful than would be a posteriori production of research information upon request from practitioners. This is the thrust of a discussion by Carter which may adequately summarize the position. He says:

> 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.[63]

MEDIA THEORIES AND RESEARCH

Since the study for which this paper is being written is concerned in part with the role of the non-print media in knowledge utilization, media theories and research will briefly be considered here.

When considering the role of media in education, one should distinguish between the commercial mass media and media used as teaching devices in the classroom. Commercial mass media may be utilized as supplementary resources in addition to classroom activities or they may be used as direct-teaching devices in the classroom. Other media forms are of limited use for enrichment purposes but are useful for direct-teaching purposes.

The two types of media can be used for purposes other than direct or supplementary teaching aids, of course. They may be utilized specifically to provide information from the research community to educational practitioners; they may serve as information channels within the specific groups, such as students, practitioners, or educational researchers; they may serve as means of presenting information to the general public, through specialized media promotion, or through discussion of educational issues in the commercial mass media, or through educational television or other media forms.

Havelock outlines the variety of media which may be utilized in the educational system.[64] The variety includes written media, such as books, journals, magazines, newspaper, and papers; oral media, such as lectures, speeches, and symposia; television; films; radio and recordings; various mailing techniques; demonstrations; programmed instruction and teaching machines.

It is not assumed that the above list exhausts the potential media forms that might be used in the diffusion of educational information. The variety and uses of media listed, however, suggest that communication media are a ubiquitous, apparently valued, element in the daily educational process.

Theoretical discussion of communication media has concentrated on the mass communication media and has been, for the most part, within the empirical tradition of behavioral science,[65] reflecting dependence, generally, on the stimulus-response theories of that tradition and, specifically, on the mathematical Shannon-Weaver model of communication. This has encouraged what Charles Wright has referred to as the "hypodermic needle model" of mass communication.[66] This conception of the influence of communication media largely ignores the role of the audience in the consumption of media products, and has encouraged a research emphasis on effects of the media.

This dominant theoretical perspective has lost ground in recent years, as communication research has grown more sophisticated and as stimulus-response theories have lost validity in the behavioral sciences. The perspective has been challenged by two alternatives. The first is technological determinism, represented by Harold A. Innis and Marshall McLuhan.[67]

The second alternative can be characterized, generally, as a shift to a user-oriented view of media use. This view found early expression in the two-step flow hypothesis, which recognized that relationships among audience members have some mitigating influence on media effects.[68] Additional support for the view came from the work of Carl Hovland and his associates at Yale.[69] The user-oriented approach reflects a basic evolution in behavioral science theory from stimulus-response theories to social interaction and social psychological points of view.

Theoretical discussions of media use in education reflect the trend toward a user-oriented perspective and away from a stimulus-response emphasis on media effects. As Truman Pierce suggested:

> Available information on the character of current educational change and how this change takes place indicates that media have played no role of importance. This need not be interpreted to mean that no important role exists for media. It does mean that any such role remains to be developed.[70]

Frank G. Jennings argues that, in the hands of a competent teacher, media in the classroom can enrich the educational process, but that, in the hands of an incompetent or lazy teacher, media may be neutral or detrimental to learning.[71] On the more pervasive level of media in the environment--an environment which includes the educational system--Jennings feels that the mass media can enrich and stimulate learning both by school children and adults.[72]

Havelock's review of research on uses of media in the knowledge utilization process presents two basic conclusions: that one-way media are effective means of informing mass audiences about an innovation, but that, for the most part, two-way transmissions are required if adoption of any given innovation requires alterations in attitudes or behavior.[73]

The most significant conclusion about the role of media in the knowledge utilization process would seem to be that media per se do not improve or increase utilization of information. It has been suggested that the usefulness of any medium in the classroom is determined more by the teacher's attitude toward it than by any intrinsic merit of that mode of conveying information.[74] If the teacher is sympathetic to use of such a device as programmed instruction, for instance, and if the students are motivated, the device may improve the efficiency of information absorption,[75] but, as Havelock writes:

> The propensity and ability of the classroom teacher to consciously or unconsciously sabotage a threat to her long-standing role as "knowledge conveyor" and, hence, her perceived competence as a teacher is now a widely recognized problem.[76]

Just as the effectiveness of media in the classroom is itself "mediated" by the manipulations of the user, so too does commercial media use seem to be predicated on some criterion other than intrinsic merit of the medium. Individuals who are heavy users of any one medium seem to be more enthusiastic users of all other media as well,[77] indicating that the media will be used most by those who have a propensity to use the media most.

Concerning the present role of mass media in knowledge utilization, there is some evidence that the media are not reliable as information sources even to those people who have a propensity to use them. William Paisley, focusing on mass media coverage of behavioral science information, found research support for the proposition that very little information--often less than one per cent of the information generated by any given scientific event or discovery--found its way to the general public through the mass media.[78]

To summarize, theoretical discussions of and research on media use range from stimulus-response emphasis on effects of media, through the social psychological and interactional emphasis on the user of media and the relationships between and among users and producers, to technological determinism. Research can be cited to support various positions, of course, but it is emphasized here that some support exists for the proposition that users themselves determine how effective the various media will be for them, depending on their individual, perceived needs.

THEORETICAL CONTEXT OF PRESENT STUDY

The preceding discussion has been an attempt to touch on theoretical assertions and research findings that might be useful for conceiving of the knowledge utilization process from a communicational perspective.[79] The purpose of this concluding section is twofold: first, to present three aspects of the knowledge utilization process which the writer considers basic to understanding that process; second, to place the communicational perspective of the NCEC study within the context of existing theories of knowledge utilization.

The first aspect is the essentially insoluble conflict which exists between the producer and the user of information and which renders impossible the creation of a totally efficient information system. The conflict arises because empirical

scientific information per se tends to be irrelevant to the layman. At the same time, the producers of the information, who define the content of any information system, have a vested interest in consumption of that information by laymen (who, in the field of educational research, include teachers). The concern of the information producers is thus the effectiveness of the system, a concept which tends to overlook the information needs of the users of the system.

Concern with effectiveness encourages emphasis on efficient engineering of information dissemination and retrieval, with a consequent emphasis on techniques and technologies and a growing divergence between the functions of the system and the needs of its target audience.

Jürgen Habermas describes this conflict between scientists and laymen. His comment may suggest why the role of communication technology is considered central by those concerned with utilization of scientific information. Habermas said:

> Information provided by the strictly empirical sciences can be incorporated in the social life-world only through its technical utilization, as technological knowledge, serving the expansion of our power of technical control. Thus, such information is not on the same level as the action-orienting self-understanding of social groups. Hence, without mediation, the information content of the sciences cannot be relevant to . . . practical knowledge. . . . It can only attain significance through the detour marked by the practical results of technical progress.[80]

The second aspect is the private nature of information utilization. That an individual might decide to use some piece of information implies that he wishes to use it for some purpose. That he finds it useful implies that he has perceived some situation in his environment that he thinks will satisfactorily be altered through application of that information. This indicates that, as Richard LaPiere suggests, "utilization" is essentially a unique mental construct.[81] By virtue of the private nature of this process, it must occur in the form of specific solutions to specific problems[82] as perceived by unique individuals. The uniqueness, specificity and privacy of the process render doubtful the assumption

that a formal information system can provide on an a priori basis the information individuals will need to solve their changing problems.

The third aspect relates to the two already discussed, for it is the paradoxical supposition that innovation or change can be fostered through use of expert guidance, such as that available through scientific information systems. Experts are least likely to see the need for unique approaches to problems, for they have been socialized into a system in which they become more expert as they become more committed and conformist to the existing organization. Thus, the information produced by experts will tend to perpetuate the existing structure and will prove that much more irrelevant to the creative or competent inquirer. LaPiere says of this problem:

> . . . the more skilled and informed an individual is in the symbols of a given subject, whether it be theology or penology, electronics or embryology, the more habituated he is to the established ways of thinking of that field and the more inhibited he is from manipulating those symbols in a random, trial-and-error way. This is the reason why highly trained and recognized experts in any field of endeavor rarely innovate in that field, . . .
>
> It is also in part the reason why the innovative process cannot be organized and why innovators cannot be deliberately produced by educational or other institutions, why a school of innovation or an institute for the production of innovators cannot exist.[83]

Discussion of these three aspects may suggest the theoretical context of a communicational perspective on knowledge utilization. To refer to Havelock's categories, the position is basically the psychological problem-solver approach. This emphasis on the information user can be found in Lee Thayer's statement:

> "Knowledge" does not inhere in data; nor does meaning or significance or relevance. Knowledge is a human achievement. Data can be stored. But it cannot be used as a precise and universal catalyst, as if for immunization. Any one who would "use" the accumulated philosophical or theoretical statements of any discipline must first enable himself to do so; he must learn how to give form and significance and relevance to the statements of others. No statement of another, whether "scientific" or not, is self-evident.[84]

Several implications significant for analyzing the knowledge utilization process can be drawn from this statement. An incomplete list might include the

following: (1) that the user, or problem-solver, is of prime importance in any discussion of knowledge utilization;[85] (2) that knowledge is different from information;[86] (3) that utilization of information is not automatically a good action, that, in fact, we can never fully know the consequences of such an action and thus can never fully know whether the utilization was beneficial or detrimental for our purposes.[87]

From a communicational perspective, the role of media in the knowledge utilization process is de-emphasized, for the inquiring individual will seek needed information wherever he can and create needed information if he must. The knowledge "user" must discover information sources which are relevant for him. This would suggest a decreased concern with technology for its own sake for the sake of increased efficiency of information dissemination.[88]

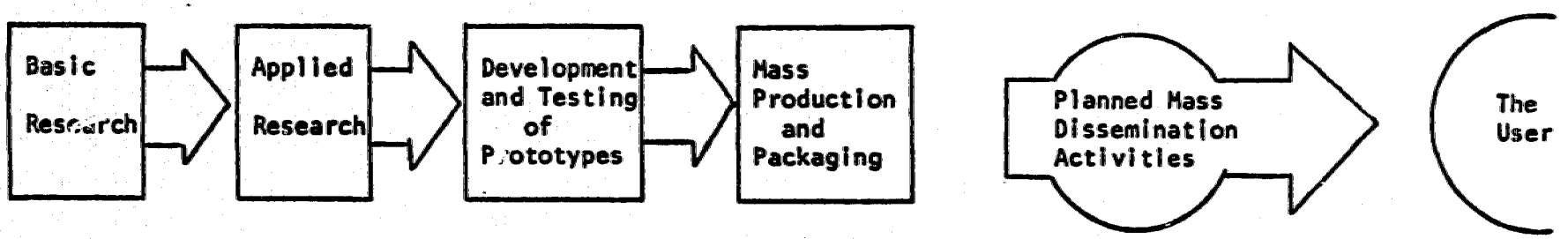
Theories and research can be found to support varying perspectives on th knowledge utilization process. With this in mind, the final conclusion of this review would simply be that the communicational perspective of the present study finds a fair amount of theoretical and research support in the extant literature on knowledge utilization in education.

APPENDIX A

Four Models of the Knowledge Utilization Process

Model 1

The Research, Development and Diffusion Perspective



Major Points Stressed: Rational Process
Planning Necessary
Division of Labor
High investment pays off in quality, quantity, long term benefit, and capacity to reach mass audience.

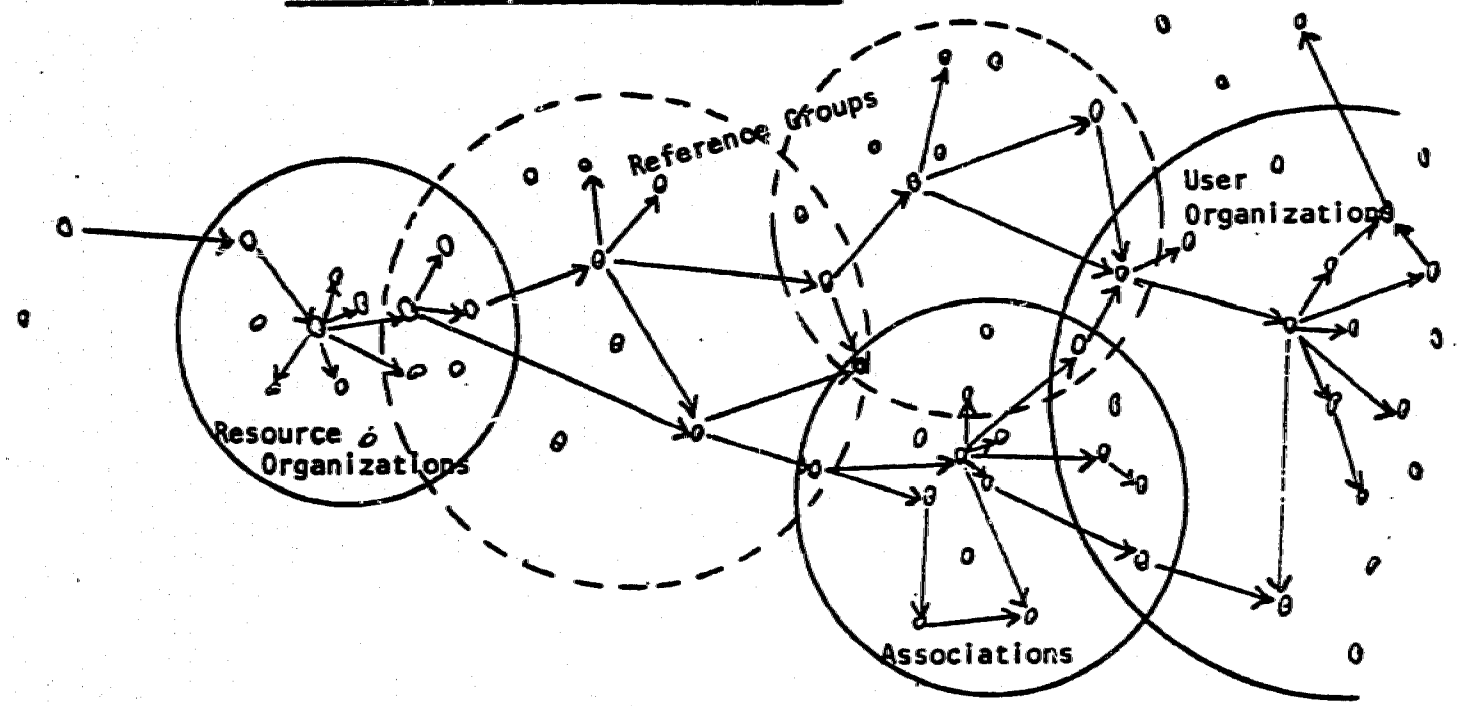
Spokesmen: Henry M. Brickell, David Clark, Egon Guba

Prototypes: Industrial R&D, U.S. Agricultural Research and Extension System

Source: Ronald G. Havelock, Planning for Innovation Through Dissemination and Utilization of Knowledge (Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, second printing, 1971), page II-6.

Model 2

The Social Interaction Perspective



Major Points Stressed: Personal Relationships
Group Memberships and Identifications
Social Structure - Power and Influence Structures
Proximity, Cosmopolliteness
Opinion Leadership Structure

Spokesmen: Everett Rogers, James Coleman, Elihu Katz, Herbert Menzel, Richard Carlson, Paul Mort

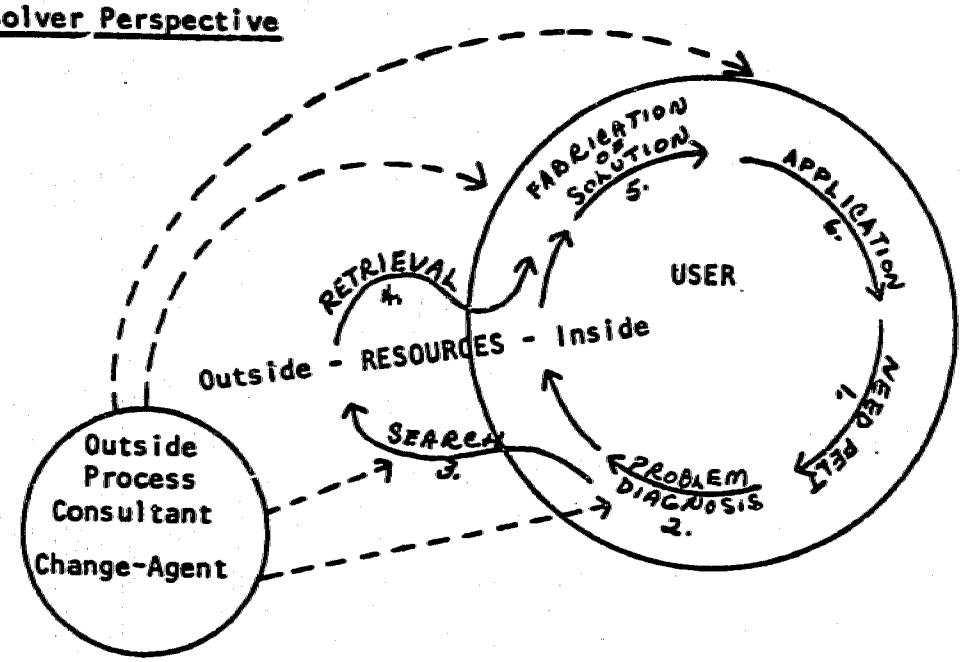
Prototypes: Diffusion of innovations in farm practices, spread of new drugs among physicians.

Source: Ronald G. Havelock, Planning for Innovation Through Dissemination and Utilization of Knowledge (Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, second printing, 1971), page 11-8.

Key:
- Individuals in the social system.
- Flow of new knowledge.
- Formal organizational structures
- Informal structures.

Model 3

The Problem-Solver Perspective



Major Points Stressed: The User's Need is the Paramount Consideration
Diagnosis is Part of the Process
The Outsider is a Catalyst Consultant or Collaborator but the User must find the Solution Himself or See it as His Own
Internal Resources should be fully Utilized
Self-initiated Change has the Firmest Motivational Basis and the Best Prospects for Long-Term Maintenance

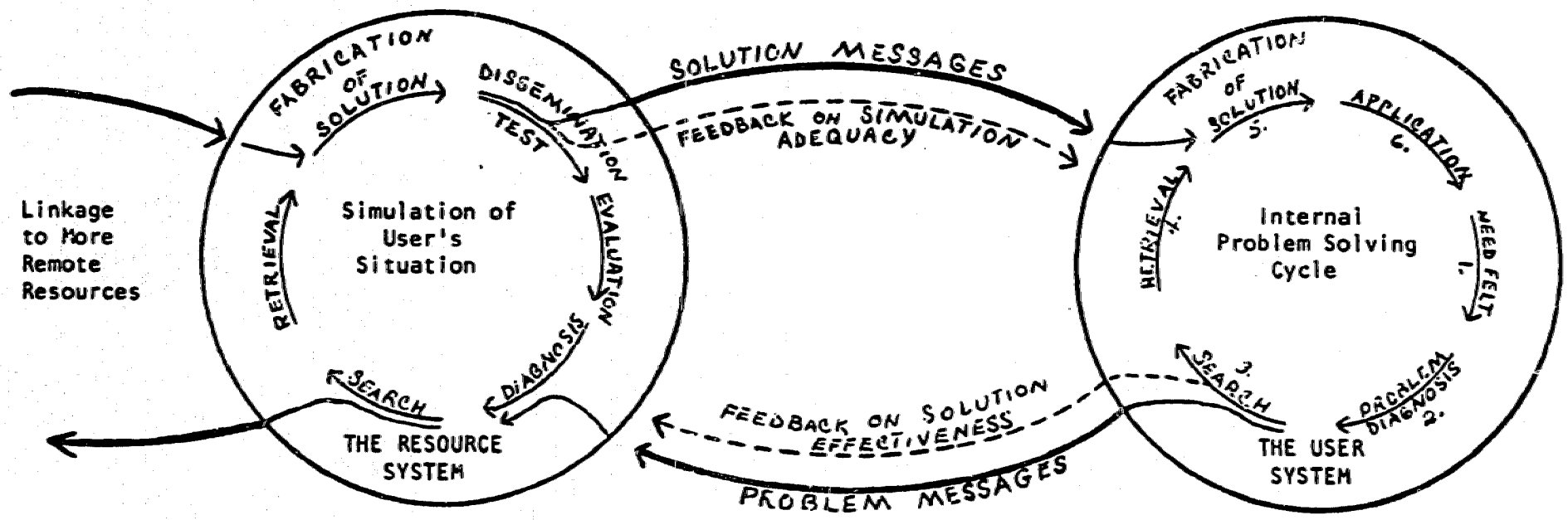
Spokesmen: Goodwin Watson, Ronald Lippitt, Herbert Thelen, Matthew Miles, Charles Jung

Prototypes: Organizational self-renewal, mental health consultation.

Source: Ronald G. Havelock, Planning for Innovation Through Dissemination and Utilization of Knowledge (Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, second printing, 1971), page 11-12.

Model 4

The Linkage Process



From the Linkage Perspective:

1. Resource system must recapitulate or adequately simulate the user's problem-solving process.
2. The user must be able to understand (and simulate) the research, development, and evaluation processes employed by the resource system in the fabrication of solutions.
3. Resource and user must provide reciprocal feedback.
4. Successful linkage experiences build channels for efficient dissemination.

Source: Ronald G. Havelock, Planning for Innovation Through Dissemination and Utilization of Knowledge (Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, second printing, 1971), page 11-16.

APPENDIX B

General Conclusions Drawn from Research

Into Knowledge Utilization

Source: Richard S. Farr, and Suzanne Pingree, Research Utilization: An Annotated Bibliography (Stanford: ERIC Clearinghouse on Educational Media and Technology, Stanford University, nd), pages 11-13.

1. In the adoption of new ideas or technologies, there are distinct stages through which an individual passes.
2. Different media have differential effectiveness in these stages: the mass media being most effective in the early stages as an individual becomes aware of a new idea and the interpersonal channels becoming increasingly important as the individual moves on into the later stages of adoption.
3. There is a two-step flow of communication from the mass media to the individual with gatekeepers or opinion leaders acting as intermediaries in this flow.
4. Opinion leaders are younger, enjoy higher social status, make greater use of cosmopolite, impersonal sources of information than those whom they influence.
5. The mass media are ineffective in changing attitudes or promoting new practices, except among a self-selected audience that is already predisposed to change.
6. The mass media are ineffective in raising knowledge levels of the entire population; the self-selected minority that "tunes in" to informational content is already above average in their knowledge. Low knowledge individuals targeted for the message are likely to "tune out."
7. The unit of adoption, that is whether or not a new idea can be adopted by a single individual alone or whether he needs the cooperation of others, determines the speed and ease with which a new idea is adopted.
8. The nature of the new idea or technology is an important determinant of the speed and ease with which it is accepted: the less risky and expensive ones are adopted first.
9. The credibility--expertise and trustworthiness--of the source of information about a new idea or technology also affects the speed and ease with which it is adopted.

10. Resistance to change, and even resistance to information itself, are often ego-defense mechanisms. Two factors, describable as "cognitive balance" and "conservation of energy" (or the "principle of least effort"), have the effect of blocking change.

11. The economic or game theory model of decision-making does not fit the data on adoption of new practices. The concept of "subjective utility" has to be defined very idiosyncratically to cover discrepancies between objective utility and actual choice.

12. There is a deep, vertical audience for educational information with at least four identifiable audiences--researchers, administrators, teachers, and the general public.

13. Education is unique in that there is no effective way by which the environment can be allowed to screen information. Other occupations in which individuals are busy and occupied with the press of other considerations allow the environment to screen the mass of available information on incoming channels. Education offers no such screening.

14. Peers, principals, and institutions within the educational system are perceived as the primary barriers to educational change by teachers.

15. Visibility of results or feedback--information on how a newly instituted change is working--are important factors in the continued trial of an innovation and further innovation.

APPENDIX C

Information Needs as Perceived by Educational Practitioners

INFORMATION ITEMS REGARDED AS MOST IMPORTANT
AND MOST DIFFICULT TO OBTAIN*

Educational Planning Area	Information Highest in "Importance"	Information Most "Difficult to Obtain"
Curriculum planning and development	Effectiveness of current curriculum	Validation of new curriculum before its adoption
Adopting new methods of instruction	Requisite teaching and administrative skills	Time and effort required for teacher retraining
Evaluating the educational program	Identifying objectives in measurable terms	Identifying objectives in measurable terms
Planning new buildings	New directions in which education is moving	Opportunities for research studies
Appraising teacher or administrator effectiveness	Criteria for an effective appraisal system	Comparability of job assignments for purposes of appraising differences in effectiveness
Grouping, promotion and grading practices	Effects on students with respect to maturation, achievment, fast learners	Later academic success of students exposed to innovative methods of grading or grouping

Source: Carl H. Rittenhouse, Innovation Problems and Information Needs of Educational Practitioners (Menlo Park, California: Stanford Research Institute, 1970), page 7.

FOOTNOTES

1. Ronald G. Havelock, Planning for Innovation Through Dissemination and Utilization of Knowledge, 2nd Printing (Ann Arbor: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, 1971).

2. Ibid., p. 1-1.

3. Paul Lazarsfeld and Sam D. Sieber, Organizing Educational Research (Englewood Cliffs, N.J.: Prentice-Hall, 1964).

   Sam D. Sieber and Paul Lazarsfeld, The Organization of Educational Research in the United States (Washington, D.C.: U.S. Office of Education, 1966).

4. Sam D. Sieber, "Institutional Setting," in The Role of Educational Research in Educational Change: The United States, ed. by Egon G. Guba (Washington, D.C.: U.S. Office of Education, 1967), p. 4.

5. Thomas D. Clemens, "Dissemination of Research Results," in Guba, The Role of Educational Research in Educational Change, pp. 41-42.

6. Sieber, "Institutional Setting," in Guba, The Role of Educational Research in Educational Change, p. 57.

7. Paul R. Mort and F. G. Cornell, American Schools in Transition (New York: Bureau of Publications, Teachers College, Columiba University, 1941).

   Paul R. Mort and O. F. Furno, Theory and Synthesis of a Sequential Simplex (New York: Institute of Administrative Research, Teachers College, Columbia University, 1960).

   Paul R. Mort, W. S. Vincent, and C. A. Newell, The Growing Edge, revised and re-issued (New York: Metropolitan School Study Council, 1945, 1953).

8. Paul R. Mort, "Studies in Educational Innovation from the Institute of Administrative Research: An Overview," in Innovation in Education, ed. by Matthew B. Miles (New York: Teachers College, Columbia University, 1964), p. 324.

9. Havelock, Planning for Innovation, p. 10-27.

10. Mort, "Studies in Educational Innovation," in Miles, Innovation in Education, p. 326.

11. Richard O. Carlson, Adoption of Educational Innovations (Eugene: Center for the Advanced Study of Educational Administration, University of Oregon, 1965).

12. Richard O. Carlson, "School Superintendents and Adoption of Modern Math: A Social Structure Profile," in Miles, Innovation in Education, p. 329.

13. The unique aspects of the public educational system 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." Sam D. Sieber, "Organizational Influences on

Innovative Roles," in Knowledge Production and Utilization in Educational Administration, ed. by Terry L. Eidell and Joanne M. Kitchel (Columbua, Ohio, and Eugene, Oregon: published jointly by University Council for Educational Administration, University of Oregon, 1968), p. 122.

14. See Charles Frankel, "Unphilosophical Pragmatism," chapter X of his book, The Love of Anxiety and Other Essays, Delta (New York: Dell Publishing Co., Inc., 1965), pp. 136-147.

15. Havelock, Planning for Innovation, p. 11-5.

16. Henry M. Brickell, Organizing New York State for Educational Change (Albany, N.Y.: New York State Education Department, 1961).

17. Henry M. Brickell, "State Organization for Educational Change: A Case Study and a Proposal," in Miles, Innovation in Education, p. 498.

18. Ibid.

19. Ibid., p. 499.

20. Ibid., p. 503.

21. Egon G. Guba, editor, The Role of Educational Research in Educational Change: The United States (Washington, D.C.: U.S. Office of Education, 1967).

22. Egon G. Guba, "Development, Diffusion and Evaluation," in Eidell and Kitchel, Knowledge Production and Utilization, p. 42.

23. Ibid., pp. 44-51.

24. Havelock, Planning for Innovation, p. 11-7.

25. Everett M. Rogers, Diffusion of Innovations (New York: Free Press of Glencoe, 1962).

    Everett M. Rogers, with F. Floyd Shoemaker, Communication of Innovations: A Cross-Cultural Approach (New York: Free Press of Glencoe, 1969).

26. Everett M. Rogers, "Preface and Overview," in Research Implications for Educational Diffusion, ed. by Everett M. Rogers (East Lansing: Michigan State University and Michigan Department of Education, 1968), p. ix.

    That the nature of the discipline in question may determine to some extent the information needs and uses of its practitioners is a point made by Diana Crane in her review of the literature about information utilization. The logical extension of this point is that research from one discipline may not apply to information utilization process of another discipline. Diana Crane, "Information Needs and Uses," in Annual Review of Information Science and Technology, Vol. 6, edited by Carlos A. Cuadra (Chicago: Encyclopaedia Britannica, Inc., 1971), p. 4.

27. Everett M. Rogers and Nemi C. Jain, "Needed Research on Diffusion Within Educational Organizations," in Rogers, Research Implications, p. 66.

28. Ibid., p. 77.

29. Ibid., p. 83.

30. Havelock, Planning for Innovation, pp. 10-30, 31, 32, 33.

31. Carlson, "School Superintendents and Adoption of Modern Math," in Miles, Innovation in Education, p. 333.

32. Havelock, Planning for Innovation, p. 10-12.

33. Ibid., p. 11-11.

34. Ibid.

35. Ronald Lippitt, Jeanne Watson, and Bruce Westley, The Dynamics of Planned Change (New York: Harcourt, Brace and Company, Inc., 1958).

36. Matthew B. Miles, editor, Innovation in Education (New York: Teachers College, Columbia University, 1964).

37. Ronald Lippitt, "Roles and Processes in Curriculum Development and Change," in Strategy for Curriculum Change, ed. by Robert R. Leeper (Washington, D.C.: Association for Supervision and Curriculum Development, 1965), pp. 12-13.

38. Havelock, Planning for Innovation, pp. 10-57, 58.

39. Matthew B. Miles, "Educational Innovation: The Nature of the Problem," in Miles, Innovation in Education, p. 19.

40. Havelock, Planning for Innovation, p. 11-14.

42. Egon G. Guba and John J. Horvat, "Concluding Note," in Guba, The Role of Educational Research in Educational Change, p. 73.

43. Richard O. Carlson, "Summary and Critique of Educational Diffusion Research," in Rogers, Research Implications, p. 4.

44. Ibid., p. 5.

45. Ibid.

46. Ibid., pp. 11-12.

47. Ibid., p. 15.

48. Ibid., p. 22.

49. Ibid., p. 21.

50. Ibid., pp. 22-23.

51. Herbert F. Lionberger, Adoption of New Ideas and Practices: A Summary of the Research Dealing with the Acceptance of Technological Change in Agriculture with Implications for Facilitating Such Change (Ames: Iowa State University Press, 1960).

    Carlson, Adoption of Educational Innovations.

    Rogers, Diffusion of Innovations.

    James S. Coleman, Elihu Katz, and Herbert Menzel, Medical Innovation: A Diffusion Study (New York: Bobbs-Merrill, 1966).

52. George M. Beal and Everett M. Rogers, "The Scientist as a Referent in the Communication of New Technology," Public Opinion Quarterly, 22 (1958), 555-563.

53. Roland J. Pellegrin, "An Analysis of Sources and Processes of Innovation in Education" (paper presented at the Conference on Educational Change, sponsored by the Demonstration Project for Gifted Youth and the U.S. Office of Education. Eugene: Center for the Advanced Study of Educational Administration, University of Oregon, 1966).

54. Kurt W. Back, "The Behavior of Scientists: Communication and Creativity," Sociological Inquiry, 32:1 (1962), 82-87.

55. M. H. Chorness, Carl H. Rittenhouse, and R. C. Heald, Decision Processes and Information Needs in Education: A Field Survey (Berkeley: Far West Laboratory for Educational Research and Development, 1968).

56. Ralph Mason, "Use of Information Sources by Influentials in the Adoption Process," Public Opinion Quarterly, 27 (1963), 455-466.

57. Carl H. Rittenhouse, Innovation Problems and Information Needs of Educational Practitioners (Menlo Park, California: Stanford Research Institute, 1970).

58. Ibid., p. 71.

59. Monahan makes this argument in discussing the decision process in administration. See page 34 of his article: William G. Monahan, "Some Limitations and Cautions in the Use of Quantitative Techniques in Decision-Making," Educational Technology, September, 1969, pp. 31-35.

    Richard Schmuck writes of the educational administrator: "He is usually expected to take action on inadequate, unreliable, and often 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 more immediately." "Social Psychological Factors in Knowledge Utilization as Applied to Educational Administration" (paper prepared for University Council for Educational Administration Development Seminar, Portland, Oregon, October 22-25, 1967. Eugene: Center for the Advanced Study of Educational Administration, University of Oregon, 1967). p. 18.

60. Launor F. Carter, "From Research to Development to Use" (paper presented at American Educational Research Association symposium, Chicago, Illinois, February 20-21, 1966. Santa Monica: System Development Corporation, 1966), p. 4.

61. Ibid., p. 24.

62. This is the position taken by Miles. He writes: ". . . university and college professors have conducted research to answer fundamental questions underlying the design of innovations, and in some cases have developed innovations as a result. The responsibility for dissemination of research findings, so as to bring about local awareness-interest, evaluation, and trial, has, however, been ordinarily assumed to belong to some other group. For example, it has often been remarked that local school personnel do not read research journals with great voracity--but the classical educational researcher continues to assume that his responsibility ends with the act of publication." Innovation in Education, p. 25.

63. Launor F. Carter, "Knowledge Production and Utilization in Contemporary Organizations," in Eidell and Kitchel, Knowledge Production and Utilization, p. 15.

64. Havelock, Planning for Innovation, pp. 9-1 - 9-41.

65. For discussion of this research tradition, see Denis McQuail, Towards a Sociology of Mass Communications (London: Collier-Macmillan Limited, 1969).

66. Charles R. Wright, Mass Communication: A Sociological Perspective (New York: Random House, 1959), p. 50.

67. Harold A. Innis, The Bias of Communication (Toronto: University of Toronto Press, 1951).

Marshall McLuhan, Understanding Media: The Extensions of Man, Signet Book (New York: New American Library, 1964).

68. Elihu Katz and Paul F. Lazarsfeld, Personal Influence: The Part Played by People in the Flow of Mass Communications (Glencoe: Free Press, 1955).

Elihu Katz, "The Two-Step Flow of Communication," Public Opinion Quarterly, 21 (1957), 61-68.

69. For example, see Carl I. Hovland, Irving L. Janis, and Harold H. Kelley, Communication and Persuasion (New Haven: Yale University Press, 1953).

70. Truman M. Pierce, "Educational Change and the Role of Media" (paper prepared for the Symposium on Identifying Techniques and Principles for Gaining Acceptance of Research Results of Use of Newer Media in Education, Lincoln, Nebraska, November 24-27, 1963), p. 15.

71. Frank G. Jennings, "Mass Media, Mass Mind, and Makeshift: Comments on Educational Innovation and the Public Weal," in Miles, Innovation in Education, pp. 563-585, see esp. 574.

72. This optimistic view of popular culture is opposed by critics such as Ernest van den Haag and Dwight MacDonald. A representative collection of pro and con arguments about popular culture can be found in Alan Casty, editor, Mass Media and Mass Man (New York: Holt, Rinehart and Winston, Inc., 1968).

73. Havelock, Planning for Innovation, p. 9-40.

74. Egon G. Guba and Clinton A. Synder, "Instructional Television and the Classroom Teacher," Audio-Visual Communication Review, 13 (1965), 5-26.

75. H. A. Schwartz and R. J. Haskell, "A Study of Computer-Assisted Instruction in Industrial Training," Journal of Applied Psychology, 50 (1966), 360-363.

76. Havelock, Planning for Innovation, p. 9-15.

77. Mason, "Use of Information Sources."

James W. Swinehart and Jack M. McLeod, "News About Science: Channels, Audiences, and Effects," Public Opinion Quarterly, 24 (1960), 583-589.

Wilbur Schramm, "Science and the Public Mind," in Studies of Innovation and of Communication to the Public: Studies in the Utilization of Behavioral Sciences, ed. by Elihu Katz et al. (Stanford: Institute for Communication Research, 1962), vol. 2, pp. 261-286.

Robert C. Davis, The Public Impact of Science in the Mass Media: A Report on a Nation-Wide Survey for the National Association of Science Writers (Ann Arbor: Institute for Social Research, University of Michigan, 1958).

78. William J. Paisley, The Flow of (Behavioral) Science Information: A Review of the Research Literature (Stanford: Institute for Communication Research, Stanford University, 1965), see esp. pp. v-19 - v-22.

79. For a statement of the communicational perspective, see Lee Thayer, "On Communication, Knowledge Utilization, and the Educational Enterprise" (Research Memorandum #5, NCEC Knowledge Utilization Study, Center for the Advanced Study of Communication, University of Iowa, Iowa City, November, 1971).

80. Jürgen Habermas, Toward a Rational Society, Beacon Paperback (Boston: Beacon Press, 1970), p. 52.

81. Richard T. LaPiere, Social Change (New York: McGraw-Hill Book Company, 1965), p. 107.

82. Ibid., p. 115.

83. Ibid., p. 119.

84. Thayer, "On Communication, Knowledge Utilization, and the Educational Enterprise," pp. 8-9.

85. This is supported by Paisley and Parker, who write: "An illogical personal reference system that always answers the queries of its creator is more effective, in our view, than a relentlessly logical universal reference system

that intimidates potential users by its complexity. From this perspective, a system cannot by evaluated without detailed consideration of the information needs and preferred search strategies of its intended users." William J. Paisley and Edwin B. Parker, "Information Retrieval as a Receiver-Controlled Communication System," in Proceedings of the Symposium on Education for Information Science, ed. by Laurence B. Heilprin, Barbara Markuson, and Frederick Goodman (Washington, D.C.: Spartan Books, 1965), p. 25.

86. Belth makes this distinction when he writes: "To educate, you see, is to confront the theoretical structuring which was the very form and screen of the messages which have been stored, and which we now seek to retrieve. For the messages themselves, the information which is the outcome of previous inquiry, are bound together into the meaning they contain on the basis of explanatory systems, purely theoretical postulations, which, unfortunately, do not get themselves stored along with the message." Marc Belth, "A Misplaced Analogy: A Rebuttal of the Proposed Relation Between Information Retrieval and Education," in Heilprin, Markuson and Goodman, Proceedings, p. 7.

87. LaPiere, pp. 66-67.

Schmuck, p. 26.

88. LaPiere's discussion of technology as an interdependent variable in the change process, rather than as an operational, self-contained unit, is applicable here. See chapter 8, "The Technological Variable," pp. 253-290.

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