The Effects of Alternative Diffusion Channels and Alternative Organizational Positions of Receivers of Diffusion Information upon Receiver Understanding and Practitioner Utilization of an Educational Innovation

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by

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If I have seen further, it is by standing upon the shoulders of giants.

--Isaac Newton
Letter to Robert Hook
February 5, 1675

I wish to express my sincere appreciation to those who have helped me see further:

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To the others who are not noted individually, but whose help and inspiration are gratefully acknowledged.

Howard T. Major
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CHAPTER I

STATEMENT OF THE PROBLEM

There is general agreement that effective diffusion of innovations is essential to the educational process. Cran dall and Harris (1973) noted that "schools are in desperate need of revitalization in order to respond to the rapidly changing requirements of a society experiencing ever more frequent and more complex advances in technology" (p. 7). Klitgaard (1973) argued that "the need for innovation is widely recognized. According to many observers, the public is generally disappointed with the present state of affairs" (p. 2). Despite that need, however, there is also general agreement that the innovation diffusion process is only marginally effective. According to Temkin and Brown (1973), "A failing of our profession is the failure of educational innovations to achieve widespread usage" (p. 10).

Disenchantment with the innovation diffusion process should not be surprising. The process of diffusing innovations is a formidable task with a notoriously long time lag. Mort (1964) reported finding the following in his early studies:

Innovation in the American school system comes about through a surprisingly slow process and follows a predictable pattern. Between insight into a need . . . and the introduction of a way of meeting that need there is typically a lapse
of a half-century. Another half-century is required for the diffusion of the innovation. (p. 318)

While most observers agree that there has been an acceleration in the diffusion process since Mort's early studies, many argue that the time lag between the discovery of an innovation and its eventual adoption or rejection is still unacceptably long. Voegel (1971) observed that in the diffusion of an innovation "a five to ten year period is still a typical lag" (p. 67).

Havelock (1971) observed the existence of a diffusion system which is facilitated by many diffusion sources and many receivers of diffusion information all clustered in various types of organizations. This system diffuses an innovation from its generation to its final utilization. According to Havelock, an innovation originates when it is discovered by basic research systems and scientists. It is then diffused to applied research and development groups, then on to linking agents, and finally, on to practitioners. The simplicity of this model implies a smooth, rational, and systematic process of innovation diffusion from research to practitioner via linking agents. In reality, however, the process is complex and hazardous at every level. House (1974) pointed out one such hazard when he noted that "the research community is an entity all its own, having little communication with or relevance for practitioners. Ideas travel relatively quickly within the research community.
itself, but scarcely creep from there to schools because the social networks simply are not there" (p. 12).

House's comments emphasize the importance of the role the linking agents identified by Havelock (1971) must assume. It is the task of the various linking agents, both individuals and organizations, to build communication bridges between the research organizations which discover and develop educational innovations and the practitioners who utilize these innovations in schools. This linking-agent role involves a series of complex tasks. The linking agent must initiate an information-transfer process between itself and each organization with which it interfaces. Then, through this information-transfer process, innovations discovered and developed at the basic and applied research levels can be diffused to the practitioner level.

Once information about the innovation reaches the practitioner level, the adoptor or adopting organization must proceed through a series of stages of adoption. These stages represent increasing levels of acceptance of, and understanding of, the innovation by members of the adopting social system. An effective diffusion process requires that linking agents not only elicit awareness that an innovation exists, but also facilitate practitioner understanding of the principles of effective utilization of that innovation. The behavioral event of actual utilization of the innovation by the educational practitioner is one objective of a diffusion
process. Attainment of such a complex set of diffusion objectives requires the formulation of a systematic diffusion strategy by the linking agent.

Innovations in Educational Technology

Educational technology, like most types of technology, is often confused with its manifestations, i.e., technological equipment and inventions. It is more accurate and more productive to think of educational technology as "organized scientific knowledge applied to the solution of practical problems" (AECT, 1977, p. 169). Because of the rapid rate of discovery and development of such organized scientific knowledge, innovation diffusion problems become particularly acute when the innovation being diffused is of a technological nature. Technological innovations are ubiquitous at the basic and applied research levels; therefore, utilization of these innovations by practitioners has been relatively slow, uneven, and often ineffective. Stanbury (1972) observed that "seldom has a marriage taken so long to be consummated successfully as the marriage of education and technology" (p. 8). This lack of utilization by practitioners often results in wasted tax money and/or missed educational opportunities.

In the effort to diffuse innovations of a technological nature, Michigan's state and regional educational media organizations serve as linking organizations between educational research development organizations and practitioner
organizations (schools). Application of the "stages of adoption" to this situation suggests that the state and regional media organizations, as linking agents, must formulate a diffusion strategy which will promote both the understanding and the utilization of technological innovations.

One such technological innovation is a professional development media collection, titled the Cooperative Network of Inservice Media (CNIM). CNIM is comprised predominantly of 16-millimeter films, which became available to Michigan's practitioners in 1979. This service has been developed at the applied research levels and is being diffused to practitioners by Michigan's Regional Educational Media Centers (REMC's). Thus, it is the task of these REMC's to formulate an effective diffusion strategy to promote the understanding and utilization of CNIM and other technological innovations.

Formulation of Diffusion Strategies

Just as instruction is facilitated by systematic learning system design, innovation diffusion is facilitated by systematic formulation of diffusion strategies. In the systematic formulation of these effective diffusion strategies, all of the critical variables related to the diffusion process and their relationship to each other must be considered. Unfortunately, the most convenient or least expensive diffusion strategy is often selected rather than the one most effective. This occurs partially because of the lack of
information about diffusion variables. Pe[legrin] (1975), observing this situation, noted:

Innovation continues to be frustrated by the lack of technologies of [diffusion] for use by [linking agents]. There is a scarcity of theoretical principles and practices which would serve as guides to action. Each attempt at innovation [diffusion] is, in effect, a voyage on uncharted seas. It is hoped that additional research in real-life settings will identify factors that facilitate the [diffusion] process. With knowledge of such factors, important steps toward creating [strategies for diffusion] can perhaps be taken. (p. 100)

In other words, Pellegrin advocated field research which would provide information about the critical variables in the diffusion process.

In defining diffusion as "the process by which . . . new ideas are communicated to the members of a social system" (p. 12), Rogers (1971) pointed out the similarity between the processes of diffusion of innovations and communication. This similarity allows for the study of the critical variables of the communication process as a vehicle to the investigation of the diffusion process. Berlo (1960) identified those variables as (a) the source, (b) the message, (c) the receiver, and (d) the channel. Manipulation of any of these variables will have an impact upon another set of variables, the effects of the communication and/or diffusion process. The differential effects of two of the critical diffusion variables, the diffusion channel and the receiver of diffusion information, upon two selected effects of the diffusion process will be investigated in this study.
The Diffusion Channel

Identifying the most appropriate diffusion channel is an essential element in the formulation of an effective diffusion strategy. The term diffusion channel in this study means the communication medium used to transmit diffusion information. Examples of potential diffusion media include film, letters, pamphlets, brochures, television, newspapers, magazines, radio, and face-to-face dyadic exchange. What appears to be a myriad of choices, however, is reducable to a dichotomous choice. Havelock (1971) defined the key factor operational in the choice of a diffusion channel as directional difference: unidirectional versus interactive. For this reason, the choice of a diffusion channel is simplified and limited in most diffusion situations to a choice between a unidirectional diffusion channel and an interactive diffusion channel.

The most common forms of such diffusion channels are: (a) print forms, which typify the unidirectional channels; and (b) face-to-face dyadic exchanges, which typify the interactive diffusion channels. This study will investigate the differential effects of each of these two common but radically different diffusion channels upon the selected effects of the diffusion process.
Receivers of Diffusion Information

The identification of the most appropriate receiver of diffusion information is the second essential element in the formulation of an effective diffusion strategy. An important consideration, in this regard, is the basis of social power held by the potential receivers. In a study of five organizational settings, Bachman (1968) found that the two most important bases of social power were (a) legitimate power and (b) expert power. The position of building principal is identified by virtually all observers as the position which holds legitimate power within the school social system. For this reason, the building principal will be one of the two designated receivers of diffusion information in this study.

The position which holds expert power will vary depending on the nature of the innovation being diffused; thus, because the innovation being diffused in this study is technological, the task at hand is the identification of a receiver who is recognized as having expertise in educational technology. The building media professional thus has been identified and will be the other designated receiver of diffusion information.

Effects of Diffusion Process

The identification of specific selected effects, i.e., objectives, of the diffusion process is also essential to
the formulation of an effective diffusion strategy. Two types of effects which are integral to the diffusion process are (a) cognitive effects and (b) behavioral effects.

Cognitive effects include the enlargement of the receiver's psychological space. Havelock (1971) pointed out that all innovations in some degree, and some innovations in large degree, call for an enlargement of this space (p. 8-47). Therefore, cognitive effects were among the effects of the diffusion process investigated in this study. These cognitive effects took the form of the receiver's understanding of the principles of effective utilization of CNIM. Correct utilization of CNIM includes the following premises:

1. CNIM material must be used to help achieve pre-established professional development goals and objectives.

2. CNIM materials must be used to support a professional development plan and not be required to stand alone.

3. CNIM materials must be used only with intended audiences, professional educators.

The cognitive effects which were investigated in this study were receivers' understanding of the above principles.

Behavioral effects are important because we know that knowledge change does "not always lead directly and immediately to behavior change" (Rogers, 1971, p. 13). The behaviors investigated in this study are the actual requests for CNIM by educational practitioners in the social systems of the receivers of diffusion information.
Summary

The purpose of this study was to investigate the effects of various combinations of diffusion channels and receivers of diffusion information upon the effects of the diffusion process. Results of this study will contribute empirical information useful to linking agents in their formulation of diffusion strategies.
CHAPTER II

REVIEW OF SELECTED LITERATURE

The literature synthesis presented in this chapter is divided into two major sections. The first section consists of a description of the several theoretical perspectives which may be used to examine the diffusion of Cooperative Network of Inservice Media (CNIM). The second section consists of a presentation of summarized relevant information for each of the critical variables in the diffusion process.

These critical variables are: (a) the diffusion source, (b) the diffusion message, (c) the receiver of diffusion information, (d) the diffusion channel, and (e) effects of the diffusion process. Three of these critical variables are foci of this study, which will investigate the differential effect of alternative diffusion channels and alternative organizational positions of receivers of diffusion information upon selected effects of the diffusion process. The literature reviewed in these sections will consist of: (a) the diffusion literature; and (b) literature in related subspecialties of social psychology, such as mass communication literature and attitude change literature which have investigated the critical diffusion variables in isolation.
Theoretical Perspectives on Diffusion Process

Four major theoretical perspectives on the diffusion process are described in the diffusion literature: (a) the research, development, and diffusion (RD & D) perspective (Brickell, 1964, 1967; Clark & Hopkins, 1966; Guba & Clark, 1976; Havelock & Benne, 1967; Miles, 1964); (b) the social interaction (S-I) perspective (Coleman, Katz, & Menzel, 1966; Holmberg, 1960; Lionberger, 1960; Rogers, 1962; Rogers & Shoemaker, 1971; Wilkening, 1953); (c) the problem-solver (P-S) perspective (Havelock, 1971; Jung & Lippett, 1967; Lewin, 1952; Lippett, Watson, & Westley, 1958; Thelen, 1967; Watson, 1967); and (d) the linkage perspective (Havelock, 1971).

In this study, the RD & D perspective and the S-I perspective have been used to examine the diffusion of CNIM, the innovation diffused. Each perspective and its relevance to the study will be described briefly.

Research, Development, and Diffusion (RD & D) Perspective

The RD & D perspective provided the basis for the process with which Michigan's Regional Educational Media Centers (REMC's), acting as a group, designed and developed CNIM. The RD & D perspective perceives the process of change from the point of view of the originator of an innovation. The RD & D process begins when initiative is taken by the
developer, who then becomes the diffusion source. The focus of the RD & D perspective is on the activities of the developer or developer system as it (a) perceives a problem and (b) designs and develops a potential solution to that problem.

CNIM was designed and developed by Michigan's REMC's, who then became the source of the innovation. The need for instructional development media was perceived by REMC personnel, and CNIM was developed to provide a solution to that need. The practitioner organizations, essentially passive, may not have been initially aware of either the problem or CNIM, its potential solution.

As an initial effort designed to diffuse information about the innovation, CNIM catalogs were distributed to each REMC. The remainder of the diffusion process, including the formulation of an effective diffusion process, was left to each individual REMC. It is at this point that the S-I perspective might be applied as a basis for a diffusion strategy within Region 12.

Social Interaction (S-I) Perspective

Several different S-I models (Coleman et al., 1966; Lionberger, 1960; Rogers, 1962; Rogers & Shoemaker, 1971) have been synthesized to form the S-I perspective described here. The S-I perspective assumes the existence of a diffusable innovation and focuses attention upon what occurs
when an innovation is introduced into a social system. While the individual is the unit of analysis for studies in the S-I perspective, attention is also focused upon the social system interaction occurring when an innovation is diffused. The S-I perspective emphasizes the reception of diffusion information, in contrast to the RD & D perspective which emphasizes the design and development of innovations.

Summary

This section of the review of literature has described the theoretical perspectives which were used to examine the diffusion of CNIM, the innovation diffused in this study. This discussion focused upon the RD & D theoretical perspective and the S-I theoretical perspective. The RD & D perspective was used to examine the theoretical basis for the process whereby the REMC's, acting as a group, designed and developed CNIM. The S-I perspective provided the basis for examination of the diffusion strategy used to diffuse CNIM. The following section of the review of literature will focus upon the objectives, i.e., selected effects of the diffusion process.

Diffusion Effects

Selected diffusion effects comprise the purposes or objectives of the diffusion process. The systematic formulation of a diffusion strategy requires that selected effects
be clearly defined before other critical variables in the diffusion process are considered. In this subsection, literature pertaining to the measurement of the effects of innovation diffusion will be reviewed. Emphasis will be placed on the cognitive and behavioral changes which take place within the receivers of diffusion information and also within the social systems which are the adopting units.

**Stages of Adoption**

While the concept of stages of adoption (which may be considered types of effects) is ubiquitous in the diffusion literature, McCutcheon and Sanders (1974) noted that these stages "reflect a continuum of responses through which a consumer proceeds as he adopts a product; research has not established that these stages are discrete, nor have reliable measures been devised to assess each response category" (p. 33).

Rogers (1962) argued that there seem to be five stages in the adoption process: (a) awareness, (b) interest, (c) evaluation, (d) trial, and (e) adoption. However, in 1971, Rogers and Shoemaker identified only four stages or "functions" in what they then called "innovation decision": (a) the knowledge function, which was subdivided into knowledge and understanding; (b) the persuasion function, in which the receiver developed a favorable or unfavorable attitude toward the innovation; (c) the decision function, which was divided
into mental trial and physical trial; and (d) the confirmation function, in which the receiver seeks support for his innovation decision. McCutcheon and Sanders (1974) accepted the concept of stages of adoption, but called them "consumer categories" (p. 33). They listed 11 such categories: (a) problem perception, (b) awareness, (c) interest, (d) comprehension, (e) attitudes, (f) evaluation, (g) legitimation, (h) trial, (i) adoption, (j) installation, and (k) institutionalization. Thus, the conceptualization of stages of adoption is supported in the literature, but there are no complementary empirical devices to show attainment of a specific stage. The exact response categories or stages will vary somewhat depending on the nature of the innovation, the adopting unit, or the author describing the event.

Identification of two types of change recurs throughout the literature. These types of change are cognitive effects, e.g., awareness (Rogers; McCutcheon & Sanders) or knowledge (Rogers); and behavioral effects, e.g., trial (Rogers; McCutcheon & Sanders) or adoption (Rogers).

Cognitive Effects

According to Havelock (1971), cognitive growth can be thought of as an enlargement of the receiver's psychological space. He claimed that all innovations in some degree, and some innovations in large degree, call for an enlargement of this space. Any attempt to diffuse an innovation must
contribute to this growth on the part of the receiver. He also noted that the effect of knowledge itself can contribute to diffusion in that "knowledge about, or the feeling that one has knowledge about, a particular innovation may predispose an individual to accept the innovation" (p. 4-30).

Informing the receiver, then, becomes an integral part of any diffusion strategy. But to what extent must the receiver understand the correct use of the innovation?

Broughton (1978) found that one of the key factors which facilitated the adoption of an educational innovation was that "the staff thoroughly understood how to use, evaluate and continually improve the program" (p. 23). Hanson (1973) reported similarly that "a person can and will accept a communication as authoritative only when . . . he can and does understand the communication" (p. 275). Woods (1971) noted that "anthropologists tell us that neither the trader, nor the missionary, nor the government official can transmit any more of his culture than he himself understands. Likewise, the change agent, lacking understanding, cannot successfully introduce an innovation that he doesn't fully comprehend" (p. 47).

Therefore, it is critical to measure the degree to which the receivers of diffusion information understand the correct use of the innovation being diffused.
Behavioral Effects

Rogers and Shoemaker (1971) noted:

There is . . . a difference between the nature of diffusion research versus other types of communication research. In the latter, we often focus on attempts to bring about changes in knowledge or attitudes by altering the makeup of the source, message, channel or receivers in the communication process . . . but in diffusion research, we usually focus upon bringing about overt behavior change, that is, adoption or rejection of new ideas rather than just changes in knowledge or attitudes. (p. 13)

They also stated that "this emphasis upon behavior change in diffusion research is rather important because we know that knowledge change does not always lead directly and immediately to behavior change" (p. 13).

Thus, it is a behavioral event that is the terminal objective of the diffusion of innovations. This behavioral event is the actual utilization of an innovation. An innovation cannot be of optimal value to a social system unless it is actually utilized.

The behavioral effects, like the cognitive effects, are vital to the diffusion process, and both must therefore be considered among the most important effects of the diffusion process.

Diffusion Channel

In this subsection, selected diffusion and related literature pertinent to the diffusion channel will be
reviewed. The diffusion channel in this study refers to the type of medium used by the diffusion source to communicate diffusion messages to the receiver of diffusion information. The diffusion channel is a critical variable in the diffusion process. The relative effectiveness of diffusion channels is an important consideration for the linking agent who is formulating a diffusion strategy. This review of the diffusion literature will focus upon two dimensions of the diffusion channel variable: (a) capacity for interactive communication, and (b) the process of diffusion channel selection.

**Capacity for Interactive Communication**

For many years, researchers attempted to ascertain the differential effectiveness of various media forms (Hoban, 1958). However, Fleming and Levie (1978) reported that "no one media type has been explicitly shown to have greater . . . effectiveness than any other media type" (p. 243). They argued that since "approaching the question from the viewpoint of media effectiveness is not satisfactory, approaching the question from the viewpoint of media attributes may be more revealing" (p. 244). The aspect of a diffusion channel that determines its effectiveness for achieving communication and/or diffusion objectives is therefore not the media or channel type but, rather, the attributes of that channel. A diffusion channel attribute can be
defined as the potential of a given diffusion channel to present diffusion messages of a certain kind.

One diffusion channel attribute is the "capacity for interactive communication." This channel attribute will be discussed in terms of the options it allows. Havelock (1971) discussed the "directional differences" between various diffusion channels. The diffusion channel attribute of "capacity for interactive communication" allows for the communication of diffusion messages which require instantaneous feedback and interaction between source and receiver.

In a series of studies involving interactive human communication, Chapanis (1975) noted:

Interactive communication involves at least two participants. The content of any particular message is determined in part by the content of prior messages from all participants and so cannot be predicted from the content of the message from any one of them. Conferences, arguments, seminars and telephone conversations are examples of interactive communication. (p. 36)

Conversely, Chapanis noted that with unidirectional communication channels such as highway signs, books, letters, lectures, and television programs, "the receiver of the message is a passive recipient of information. Nothing he says or does affects the communicator, the communication process or the content of the message" (p. 36). The most commonly used interactive diffusion channel option is face-to-face dyadic exchange.
Process of Channel Selection

The question of the relative effectiveness of unidirectional and interactive diffusion channels is a major focus of this study. Rogers and Shoemaker (1971) addressed the issue, stating that "differing communication channels function at different stages in the receiver's innovation adoption process" (p. 209). They also noted that the amount of feedback readily available is high for the interactive diffusion channels and low for unidirectional channels and that the ability to overcome selective exposure is also high for interactive diffusion channels and low for unidirectional channels. They noted that the possible effects of the interactive channels include transfer of complex knowledge, while the possible effects of unidirectional channels are limited to receiver awareness and the transfer of some simple knowledge. However, Rogers and Shoemaker also noted that the speed of information transfer to large audiences is slow for the interactive diffusion channels and rapid for the unidirectional channels.

Havelock (1971) also pointed out that each choice offers advantages and disadvantages. The main advantages in using the one-way, relatively impersonal diffusion channels are the ease of packaging of messages for this form of channel and the disseminating of such diffusion messages to large audiences. Havelock favored the unidirectional transmission of
knowledge: "(a) when the message is not likely to elicit audience resistance, and (b) when diffusion objectives focus only upon making the receiver aware of an innovation or arousing his interest" (p. 2-16). It is important to note that implicit in Havelock's statement is its corollary, that unidirectional diffusion channels are not adequate for accomplishing diffusion objectives which include bringing about thorough receiver understanding or utilization. Thus, use of the interactive channel is essential if the diffusion objectives of (a) understanding by receivers of the principles of correct utilization and (b) actual utilization of the innovation are to be achieved.

Summary

The systematic formulation of a diffusion strategy requires the selection of a diffusion channel based upon consideration of channel attributes as they relate to the attainment of selected diffusion effects, i.e., objectives of the diffusion process. The critical channel attribute comprising the focus of this study was capacity for interactive communication.

The Receiver

Berlo (1960) used the term decoder-receiver, which emphasizes the concept that the message has no meaning until it is decoded by the receiver. According to proponents of
this perspective, the meaning of the communication is within the perceptions of the receiver, indicating the importance of the role of the receiver in the diffusion process. A thorough understanding of the role of the receiver is essential to the formulation of an effective diffusion strategy. The receiver of diffusion information should be considered along two dimensions: (a) receiver characteristics and (b) selection criteria for receiver.

Receiver Characteristics

Brubaker and Nelson (1975) identified both the individual and the educational organization, or social system, as foci of change and recommended that, in a given situation, one should try to focus primarily on one arena but not to the total exclusion of the other. Rogers and Shoemaker (1971) noted that

of course change at these two levels is closely related. If we regard the school as a social system, then the school's adoption of an innovation will lead to individual teacher changes in behavior. Similarly, the aggregation of a multitude of individual changes produces a system-level alteration. (p. 10)

Despite Rogers and Shoemaker's contention that social systems and individuals are closely related receivers of diffusion information, a controversy exists over which should be the target of diffusion information and investigation. Boyd and Immegart (1977) argued:
It is a great irony of the research on innovation in education that after decades of studies it now appears that we are only beginning to ask the right questions. Until recently, most scholars derived their approach from the tradition which focused upon the characteristics of individuals adopting small-scale and precise technical innovations . . . but the more appropriate focus in education is upon formal organizations. (p. 51)

Similarly, Deal and Baldrige (1974) pointed out that in many of the earlier studies "the innovation's adopter was either an individual or a small group, not a complex organization. . . . [However], the adopter of most educational innovations is a complex organization [the school]" (p. 5). They concluded that "since educational innovations are adopted primarily by complex organizations rather than by individuals, an organizational approach to educational innovation is likely to be more successful than an individualistic approach" (p. 5). Temkin and Brown (1973) echoed that argument, observing that "educational innovations are primarily adopted by complex organizations, not by individuals" (p. 12). Giacquinta (1975) expanded upon that observation, noting that "receptivity to change, rather than linked to personality characteristics, is due primarily to structural forces, i.e., the positions or statuses that people hold, and the degree to which an innovation benefits or threatens their statuses" (p. 56).

These and similar arguments common throughout the recent diffusion literature point to the need for consideration of the characteristics of schools as social systems, as well as
with the more traditional study of characteristics of individuals.

**Characteristics of schools as social systems.** Carlson (1975) provided a list of generalizations about the characteristics of schools as social systems and potential innovation adopters. The list includes the following: (a) school districts and schools in which there is an internal advocate for an innovation are more likely to adopt that innovation; (b) school districts and schools that are characterized by open communication among teachers and between administrators and teachers are more likely to adopt innovations; and (c) school districts and schools that have established relations with outside linking agents are more likely to adopt innovations.

A further identification of organizational characteristics of schools provided by Giacquinta (1975) argued:

> The key features about schools as complex organizations . . . are that a school has a set of formally defined positions or statuses, e.g., principal, teacher or student, and that associated with each status is a set of expectations for behavior, or norms, that prescribe and proscribe behavior vis-a-vis the other statuses. These sets of norms or expectations are called roles. It is important to note that not all roles are formally acknowledged nor are there perquisites associated with the enactment. Indeed, many are hidden from outsiders and many contradict the formal elements of a school. (p. 103)

Thus, it is important to consider the formal and informal positions and roles of potential receivers of diffusion information.
Characteristics of the individual receiver. The predominant point of view expressed in the literature is that the adopting unit of educational innovations is a social system, i.e., the school. However, this does not negate the importance of the individual receiver of diffusion information since the social system is comprised of individuals. Fleming and Levie (1978) referred to several individual receiver factors or characteristics. These factors include: (a) topic-specific factors such as a commitment to, or against, a specific innovation; (b) demographic characteristics such as age, sex, etc.; and (c) aptitudes and personality characteristics such as intelligence, self-esteem, etc.

Havelock (1971) discussed several characteristics of the individual receiver which are relevant to the diffusion process. These characteristics include: (a) interpsychic characteristics such as a sense of competence and self-esteem, values, needs, feelings of threat, effects of fear, and the effects of past experience; (b) the openness (or closedness) of individuals to the giving and receiving of new information; and (c) the rationality of the individual receiver. Havelock argued that the receiver is indeed rational, saying, "Individuals will, if there are alternative paths open to them, usually make a decision which is consistent with their experiences and their own priorities" (p. 4-33). Support for this argument for receiver rationality comes from Holloway (1978), who stated that it is rational "to exhibit political
Another set of individual receiver characteristics was presented by Guba (1967). Guba suggested seven assumptions which must be considered about receivers. These assumptions are: (a) value assumption, in which the adopter is viewed as a professionally oriented entity that can be obligated to adopt through an appeal to values; (b) didactic assumption, in which the adopter is viewed as a willing but untrained entity; (c) rational assumption, in which the adopter is viewed as a rational entity; (d) psychological assumption, in which the adopter is viewed as a psychological entity; (e) economic assumption, in which the adopter is viewed as an economic entity who can be compensated with rewards for agreeing to adopt or be deprived of such rewards for refusing to adopt; (f) political assumption, in which the adopter is viewed as a political entity who can be influenced to adopt; and (g) authority assumption, in which the adopter is viewed in a bureaucratic system as an entity who can be compelled to adopt.

Receiver characteristics are critical for those who formulate diffusion strategies. Characteristics should be considered which relate to the attainment of diffusion objectives. This process should form the basis for receiver selection.
Receiver Selection

A recommendation prevalent throughout the diffusion literature is that linking agents make efforts at "identifying and involving appropriate personnel in change undertakings" (Wolf, 1975, p. 4). Wolf stated further that "the adoption of an innovation is partially a function of the position and status of involved members of a target audience" (p. 6). Similarly, House (1974) recommended the use of "entrepreneurship" (p. 3), an advocate working within the system, which he argued "is required to overcome the rigid internal structure if the innovation is to succeed" (p. 3). Further support for such a technique was provided by Eibler (1969), who noted that "a small segment of the faculty is responsible for the variations in perception . . . of the faculty. Who are these leaders? How can they be located? [The key is in] . . . isolating key people and defining how they operate to either set the stage for change or implement existing knowledge" (p. 526). These key individuals within the social system are called "opinion leaders" by Gillie (1971), who stated that "an opinion leader is one to whom persons within the system turn for advice and information on a frequent basis" (p. 13). Rogers and Shoemaker (1971) noted that other terms have been used by various researchers for a more or less similar concept. "These terms include fashion leaders, gatekeepers, influencers, information leaders, key
communicators, style setters, and tastemakers" (p. 199).

Utilization of these opinion leaders in the diffusion process is made possible by a technique called the "two-step flow" of diffusion information. According to E. Katz (1957), the two-step flow hypothesizes that "ideas often flow from radio and print to opinion leaders and from these to less active sections of the population" (p. 61). The concept of opinion leadership was first developed by Lazarsfeld, Berelson, and Gaudet (1944) in a study of political behavior in the 1940 presidential election. This hypothesis, tested in a series of studies (E. Katz, 1957), was "largely corroborated" (p. 61). The hypothesis has been expanded to include other forms of communication in addition to radio and print. Much of the research done in the diffusion of innovations has applied this two-step flow technique. Rogers and Shoemaker (1971) argued that "success is positively related to the extent that he [the agent] works through opinion leaders" (p. 243). However, a potential difficulty with the diffusion of innovations via the two-step flow of diffusion information is that receivers/opinion leaders may vary in respect to the thoroughness and methods with which they transmit the diffusion information to others in the social system.

The identification of opinion leaders in a school requires consideration of the bases of social power and authority which contribute to opinion leadership. French and Raven (1960) described five bases for the social power
which person "o" can exert over person "p." Those bases are

(a) reward power, based on "p's" perception that "o" has the ability to mediate rewards for him, (b) coercive power, based on "p's" perception that "o" has the ability to mediate punishment for him, (c) legitimate power, based on the perception by "p" that "o" has a legitimate right to prescribe behavior for him, (d) referent power, based on "p's" identification with "o," and (e) expert power, based on the perception that "o" has some special knowledge or expertness. (p. 612)

Using power variables adopted from French and Raven, Bachman (1968) examined the bases of supervisory power in five organizational settings. The investigator observed that "the most important reason for compliance was response to legitimate power and expert power. Referent and reward power were cited less often, with coercive power the least likely reason for compliance" (p. 229). Sergiovanni and Starratt (1971) noted that "this trend seems more pronounced for organizations described as professional. . . . Public schools would be expected to respond similarly" (p. 45).

Thus, in schools, legitimate power and expert power emerge as the most likely power bases for opinion leaders. Identification of the positions and roles which hold these bases of social power will provide identification of opinion leaders.

There is no doubt that the role which is perceived to hold legitimate power in a school is the building principal. Lipham and Hoeh (1974) observed that "the principal is the head of a formal organization [the school] that has some
characteristics similar to other organizations as well as some that are unique" (p. 98), and that "almost everyone agrees that the principal should be the instructional leader of the school" (p. 205). There is also a great deal of support in the literature for the idea that the principal is the key figure in the innovative process. In a review of innovation diffusion studies, Huberman (1973) remarked that "in a remarkable number of case studies, the decisive figure emerges as the chief administrator of the school" (p. 43). Similarly, Paul (1974) noted that "over half the decisions in the instructional development committees [in Wisconsin elementary schools] were made unilaterally by principals" (p. 14). Simmons (1971) observed that "many forces come into play to establish the direction, but the principal ends up the key person to bring about change effectively" (p. 117). Perryman (1973) chastised would-be change agents for "failing to seek out an opportunity to communicate with the principal" (p. 36). Goodridge (1976), in a study of adoption patterns, found that principals were the major decision-makers concerning the decision to adopt an innovation.

Thus, the principal is perceived to be the source of legitimate power and authority in the school. The principal is an opinion leader in virtually all schools. For these reasons, the principal will be one receiver of diffusion information in this study.

The second base of authority and/or power which was
found to be perceived as the most important reason for compliance was that of expert power. The legitimate power base in a school almost always resides in the role of principal; however, the position attributed expert power fluctuates, depending on the nature of the innovation. In the diffusion process, that fluctuation will often depend on the nature of the innovation being diffused. For example, if the innovation under consideration were a new reading program, then those teachers who have advanced training in the teaching of reading would accrue some expert power and would therefore be viable opinion leaders for that particular innovation.

In the case of the innovation being diffused in this study, CNIM, the viable opinion leader is the building media professional. This is true for two reasons: (a) the media format of CNIM establishes the innovation as being within the domain of the media professional; and (b) the focus of CNIM, instructional development, is an emerging role of the building media professional. Support for this emerging role is outlined by Rosenberg (1978), who stated, "Media specialists have long been associated with competence in instructional materials selection, development and utilization. Specialists today are developing additional skills in instructional design and evaluation. Media specialists can offer a great deal to the instructional development process" (pp. 12-13). Additional support for this perceived instructional development role of the building media professional is found.

For these reasons, the school media professional is considered to have "expert power" in the diffusion of CNIM and will be a receiver of diffusion information in this study.

Summary

Both social systems and individuals were identified as potential targets of diffusion information. Characteristics which affect each in his/her functioning as a receiver of diffusion information were identified, e.g., professional orientation, rationality, and receptivity to change.

The selection of a receiver of diffusion information was considered. The role of the opinion leader in the diffusion process was identified. The two-step flow of diffusion information was described as a technique for utilizing opinion leaders, and considerations for the identification of the opinion leaders in a social system were examined. Building principals and building media professionals were identified as potential opinion leaders.

Diffusion Source

The source of diffusion information (diffusion source) is another critical variable in the diffusion process. Dimensions of the diffusion source variable considered in this review are: (a) location of the diffusion source in
the diffusion system, (b) perceived characteristics of the diffusion source, and (c) roles and activities of the diffusion source.

Location of Diffusion Source

Emphasis upon the importance of the source in the diffusion system is recurrent throughout the diffusion literature. Rogers and Shoemaker (1971) distinguished between change which is initiated from within an organization and change which originates externally. Havelock (1971) pointed out that change which originates internally is likely to have a stronger motivational base than does change which originates external to the practitioner organization. He also identified five external "institutional fathers" for the diffusion process: (a) the university, (b) government, (c) commercial organizations, (d) linking agents supported by the practitioner organizations, and (e) independent linkers. A weak motivational base within the practitioner organization should be a concern for a linking agent who formulates a diffusion strategy intended to diffuse an innovation originating from an external source.

Perceived Characteristics of Diffusion Source

Another dimension of the diffusion source variable consists of perceived characteristics of the diffusion source.
The diffusion literature consists almost entirely of normative statements about optimizing receiver perception of desirable source characteristics. For the most part, the empirical literature upon which these normative pronouncements are based originates from studies in related sub-specialties of social psychology. The types of characteristics that have received the most study may be grouped into three classes: (a) the credibility of the diffusion source, (b) the attractiveness of the diffusion source, and (c) the nature of the source-receiver relationship (Fleming & Levie, 1978). It is important to note that none of these classes of characteristics is a constant property of the diffusion source, but are, rather, attributions "conferred upon the source by the receiver" (p. 199). The word "perceived" is used here to emphasize that point.

Credibility of the communicator. Hovland, Janis, and Kelly (1953) conducted a series of studies which investigated communicator credibility and found greater acceptance of a communication when the communicator has high credibility. The distinction was made by Hovland et al. between perceived communicator expertness and perceived communicator trustworthiness. Expertness was defined as "the extent to which a communicator is perceived to be a source of valid assertions" (p. 21), and trustworthiness as "the degree of confidence in the communicator's intent to communicate the assertions he considers the most valid" (p. 21).
(1976) told subjects to imagine the most credible or believable news source they could and then describe that source. The source imagined was described as being knowledgeable, attractive, trustworthy, articulate, and stable. Implicit in these studies is the importance of source credibility in the diffusion process. The linking agent who formulates an effective diffusion strategy must optimize receivers' perception of the expertness and trustworthiness of the diffusion source.

Source attractiveness. A second characteristic of the diffusion source is identified by Fleming and Levie (1978) as source attractiveness. This differs from source credibility in that credibility tends to be topic-specific, while source attractiveness is largely irrelevant to topical concerns. Source attractiveness involves such considerations as source-receiver similarity (especially ideological similarity), familiarity, physical appearance, and receiver's "liking" of the source. Rogers and Shoemaker (1971) noted that when the source and receiver "share common meanings, a mutual subcultural language, and are alike in personal and social characteristics, the communication of ideas is likely to have greater effects in terms of knowledge gain, attitude formation and change, and overt behavior change" (p. 14). Fleming and Levie (1978) maintained that "communication failure can often be traced to a dissimilarity between the implicit assumptions held by the two parties" (p. 205).
Source-receiver relationship. A third characteristic of the diffusion source which affects the diffusion process is the source-receiver relationship. This relationship has been examined empirically by Kelman (1961), who identified three persuasion situations based upon the social relationship between the source and receiver: (a) compliance, (b) identification, and (c) internalization. If the source has control over rewards and punishments, the relationship is one of compliance. If the source and receiver hold a mutually satisfying relationship and accept mutual influence for the purpose of perpetuating the relationship, then the relationship is based upon identification. If the source has no leverage over the receiver, then the message will be accepted or rejected for reasons other than the source-receiver relationship and the persuasion is due to internalization.

Roles and Activities of Diffusion Source

An examination of the diffusion literature reveals several roles and activities of the diffusion source. A typology of linking roles, or source roles, offered by Clark and Hopkins (1966) includes "inventing, packaging, informing, evaluating, demonstrating, training, servicing and nurturing" (p. 7).

Similarly, Havelock (1971) listed seven diffusion source activities: promotion of awareness, informing or telling,
demonstrating or showing, training, helping, servicing, and nurturing. In a more general sense, Corbett and Guttinger (1977) suggested that the linking organization "can place itself in the role of the user and relate to the user's needs and problems" (p. 6). Implicit in these lists of diffusion source activities is the idea that the diffusion source must formulate a diffusion strategy and select source activities to optimize the effectiveness of that strategy.

Summary

This review has focused upon three dimensions of the diffusion source. These dimensions are: (a) location of the diffusion source in the diffusion system, (b) characteristics of the diffusion source, and (c) roles and activities of the diffusion source.

Implicit in these considerations of the diffusion source are many potentially important intervening factors which could have an impact upon the diffusion process. Each of these potential sources of variability must be considered by a linking agent who is attempting to formulate an optimally effective diffusion strategy.

The Diffusion Message

Both message content and message design can have impact upon the diffusion process. The message content is the subject matter and/or meaning contained in the message. The
message design focuses upon the organization of the message content.

**Message Content**

Much of the diffusion literature which relates to message content is prescriptive and not empirically based. However, the related subspecialties of social psychology such as communications literature and attitude change literature provide an empirical framework for the analysis of message content in the diffusion process. A typical example of the prescriptive diffusion literature is offered by Pray (cited in Shoenfield, 1963), who prescribed the development of a "clear, vigorous and inspiring statement about your [innovation]" (p. 5). McCutcheon and Sanders (1974) recommended asking questions such as: "What exactly do you want to get across to your receiver?" (p. 46). They also advised the prospective linking agent to "decide on a message or series of messages and then refine it" (p. 46). Eliciting feedback from colleagues and pilot-testing the message were also recommended by McCutcheon and Sanders.

Empirical studies which relate to message content are found predominantly in the attitude change literature and the communication literature. These studies highlight six major issues of message content: (a) including or not including information about the source, e.g., source identification; (b) addressing needs and values of the receiver,
e.g., professionalism; (c) stating or not stating the conclusion; (d) the advancement of a strong versus a moderate position; (e) the use of appeals to emotion, e.g., humor or fear; and (f) introducing and refuting opposing arguments (Fleming & Levie, 1978).

Message Design

Two variables which relate to message design are identified in the literature: (a) message sequence and (b) message repetition.

Message sequence. The diffusion literature does not address the question of message design, apart from that of message content. However, the empirical literature from related subspecialties of social psychology looked closely at the organization of persuasive arguments in a single message (Cromwell, 1950; Hovland et al., 1953; Sponberg, 1946).

The focus of this empirical literature is on the order of presentation of persuasive arguments. Whether placement of the strongest persuasive arguments should occur early in the message (anticlimactic order) or late in the message (climactic order) was found to be a function of the nature of the objectives of the communication and the nature of the receiver.

Message repetition. Fleming and Levie (1978) noted that "repetition helps. But only up to a certain point"
(p. 226). While mass media channels rely on multitudinous repetitions, McGuire (1968) observed that this is because they are targeting different members of a changing audience. The diffusion of innovations, however, targets specific receivers and Fleming and Levie (1978) have noted that "for a given receiver, little gain is likely after one or two repetitions" (p. 226).

Summary

Two dimensions of the diffusion message were examined: (a) message content and (b) message design. The linking agent must design and communicate the optimally effective diffusion message to the receivers of the diffusion information. Application of the literature reviewed to this study will be described in Chapter III.

Summary

The emphasis of the review was based on the relevance of the literature to the major variables which are investigated in this study. These variables are: (a) the diffusion channel, (b) the organizational position of the receiver of diffusion information, and (c) selected effects of the diffusion process.

Each of these variables can be manipulated by a linking agent such as REMC 12 in an effort to apply an optimally effective diffusion strategy to each idiosyncratic diffusion
situation. If such applications of diffusion strategies are to be systematic rather than haphazard, they must be based on empirical data which indicate how these variables relate to the diffusion objectives and to each other. This study represents an attempt to provide such data through an investigation of the relationships between diffusion variables.

The two levels of the diffusion channel variable in this study are print and dyadic exchange. These two levels reflect the presence (dyadic exchange) or absence (print) of a channel attribute, i.e., the capacity for interactive communication.

The two levels of the organizational position of the receiver of diffusion information are the building principal and the building media professional. These two levels represent two bases of organizational authority and power, i.e., legitimate power and expert power (Bachman, 1968).

The selected effects of the diffusion process represent two types of diffusion objectives: (a) cognitive effects and (b) behavioral effects (Broughton, 1978; Hanson, 1973; Rogers & Shoemaker, 1971). Cognitive effects focus upon receiver understanding of the principles of effective utilization of the complex educational innovation. Behavioral effects focus upon actual utilization of the innovation by practitioners in the educational organization. These selected effects focus upon one diffusion effect which measures the impact of the diffusion process upon the
individual receiver (receiver understanding) and one diffusion effect which measures the impact of the diffusion process on the receiving social system as a whole (practitioner utilization).
CHAPTER III

PROCEDURES

This chapter provides a detailed description of the procedures used in this study. These procedures were designed to investigate the effect of two independent variables: (a) the diffusion channel used to communicate diffusion information; and (b) the organizational position of the receiver of diffusion information upon two dependent variables—(1) the receiver's understanding of the innovation and (2) utilization of the innovation by members of the receiver's social systems. The study was designed to test six major research hypotheses as follows:

1. The attributes of differing diffusion channels will cause a difference in the receiver's understanding of the principles of effective utilization of a complex educational innovation.

2. The attributes of differing diffusion channels will cause a difference in the number of utilizations of an innovation by individuals in the receiver's social systems.

3. The organizational position of the receiver of diffusion information will have a differential effect upon the receiver's understanding of the principles of effective utilization of a complex educational innovation.

4. The organizational position of the receiver of diffusion information will have a differential effect upon the number of requests for an innovation by individuals in the receiver's social systems.
5. The attributes of differing diffusion channels will differentially affect the receiver's understanding of the principles of effective utilization of a complex educational innovation, depending on the receiver's organizational position.

6. The attributes of differing diffusion channels will differentially affect utilization of a complex educational innovation by individuals in the receiver's social system, depending on the receiver's organizational position.

Population of the Study

This study was designed to provide empirical data pertaining to the relationships between three critical variables in the diffusion process: (a) diffusion channel, (b) organizational position of the receiver of diffusion information, and (c) selected effects of the diffusion process. These data are useful to linking agents at the regional level who are diffusing innovations to educational practitioners. Thus, the population of this study consists of educational practitioners who are targets of diffusion activity by regional linking agents. A sample was assigned which allowed for investigation of these critical variables with a representative region, Michigan's Region 12.

Region 12 is one of 22 regions in Michigan which were created in 1972 by Public Act 55. Regional Educational Media Centers (REMC's) were also created by this act to provide access to, and effective utilization of, educational media and to provide a linking agent between research and
development systems and practitioner systems (schools).

Schools in Region 12 are served by REMC 12 and provided the potential for a sample to be used in this study. These schools are typical of the schools in Michigan's 22 regions in the following ways:

1. Educators in REMC 12 schools contribute to the development and maintenance of CNIM (through REMC 12) and are thus eligible for utilization of CNIM materials.

2. Region 12 consists of urban, suburban, and rural school districts varying in student population from 14,000 K-12 students in 31 buildings, to 400 K-12 students in 2 buildings.

3. REMC 12 has a diversity of clients who represent all races, religions, socio-economic statuses, ages, and professional specializations.

4. REMC 12 serves 41 public school districts which group students in elementary, middle, junior high, and senior high schools.

REMC 12 schools were withheld from the normal CNIM (Cooperative Network of Inservice Media) diffusion patterns. Toward this end, the principal investigator met with the Region 12 Instructional Division, which consists of consultants who work with Region 12 educators. These consultants, under normal conditions, would diffuse CNIM in Region 12. At this meeting, the members of the Instructional Division agreed to refrain from diffusing CNIM until after the completion of this study.
Description of Independent Variables

The two independent variables which were investigated in this study are (a) the diffusion channel and (b) the organizational position of the receiver of diffusion information. Each of these variables will be described in this subsection.

In order to isolate the effects of these two independent variables while holding the other diffusion variables constant, diffusion stimuli were carefully developed. Diffusion stimuli are print, verbal, and other agents which confront the receiver of diffusion information. The systematic development of these stimuli is also described in this subsection.

Diffusion Channel

The diffusion channel variable consists of two forms or levels: (a) the print channel and (b) the dyadic exchange channel. The print channel consisted of a form letter and a CNIM catalog which were sealed in a single envelope and addressed to the organizational position of the receiver of diffusion information. Specific characteristics of the stimuli transmitted via the print channel will be described.

The dyadic exchange channel consisted of a face-to-face consultation between the principal investigator and the receiver of diffusion information. The dyadic exchange was arranged 1 week in advance via telephone. The dyadic
exchanges occurred in the receivers' offices. No other people were present during the dyadic exchanges. The receiver of diffusion information was the only building contact made by the principal investigator. The principal investigator, serving as linking agent, arrived at the school building 5 to 10 minutes prior to the designated consultation time. Specific characteristics of the stimuli transmitted via the dyadic exchange channel will be described.

Organizational Position of Receiver of Diffusion Information

The organizational position of the receiver of diffusion information is the second independent variable investigated in this study. This variable also consists of two levels: (a) the building principal and (b) the building media professional. The building principal represents a "legitimate" basis of organizational power and authority for the diffusion of CNIM and is, therefore, a plausible selection as a receiver of diffusion information.

The building media professional represents an "expert" basis of organizational power and authority for the diffusion of CNIM and is, therefore, the other plausible selection as a receiver of diffusion information.
Development of Diffusion Stimuli

In order to isolate the effects of the independent variables, diffusion stimuli were developed which would (a) hold other variables such as diffusion source and diffusion message constant, i.e., not allow them to vary systematically within a level of the independent variable; and (b) optimize understanding of CNIM.

Each channel, print and dyadic exchange, contained identical message content and identical message design to the greatest degree possible. While the channel attribute "capacity for interactive communication" allows for some variance in message content and design, a systematic attempt was made to exclude all other contaminating message variance. The dimensions of potential message variance and the subsequent decisions which comprised an attempt to eliminate such variance while maintaining optimal message effectiveness are listed immediately below.

The diffusion message consisted of the following components (see Appendix A):

1. Identification of the CNIM catalog.
2. Identification of the source.
3. Announcement of CNIM availability for use by all Michigan educators.
4. Note made of the description on inside of front cover of CNIM catalog.
5. Identification of CNIM characteristics and requirements for effective utilization.

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6. A request that the receiver of diffusion information make the educators in the receiver's buildings aware of CNIM and procedures for its effective use.

7. Identification of the principal investigator as a media consultant with the CNIM project.

This format was the same in the print and dyadic exchange diffusion channels. The message content and design were devised through a series of pilot tests, and the following decisions regarding dimensions of the message variable were made based upon the pilot and the literature. These decisions concern content and design as opposed to the seven points listed above.

One dimension of the message variable which requires a decision is whether or not to include information about the source. Fleming and Levie (1978) recommended that information about the source be part of the message if the source is not well known by the receiver but possesses characteristics which may facilitate attainment of the objectives. The information about the source which was included in this message was identification of the diffusion source as REMC 12. For the print diffusion channel, this identification took the form of an REMC 12 logo and the use of the REMC 12 delivery system. For the dyadic exchange diffusion channel, this identification took the form of a verbal statement from the principal investigator that identified him as a CNIM consultant working with REMC 12.
Another dimension of the message variable is the question of whether to state the conclusion explicitly rather than to allow receivers to draw their own conclusions. Fleming and Levie argued that it is almost always advisable to state the conclusion. The conclusions were stated rather than implied in the diffusion message. Once again, this was true in both the dyadic exchange and the print form of the message.

Another dimension of the message variable is the extremity of the position advanced. Fleming and Levie argued that "when the receiver has low involvement in the issue, advocating an extremum position on the issue will result in the greatest change. When the receiver has high involvement, advocating opposition only moderately different from the receiver's initial position will result in more change than advocating an extreme position" (p. 220). Because previous receiver involvement with CNIM is likely to be low, a relatively extreme position was advanced. This position was extreme in the sense that an advocacy rather than a neutral approach to describing CNIM was taken by the source. The letter and the verbal presentation of CNIM expounded on its positive points, and the CNIM catalog described the media items in a very positive style. Thus, the print and the dyadic exchange diffusion channels responded similarly to this dimension of the diffusion message.

Another dimension of the diffusion message is the
question of using appeals to emotion, especially fear arousal or humor. Mendelsohn (1964) warned of a boomerang effect and recommended that appeals to emotion be used sparingly. For this reason and also because of possible incongruence with the assumption of a professional orientation, appeals to emotion were avoided in the message. This was true of both diffusion channels, print and dyadic exchange.

Still another dimension of the diffusion message concerns the question of introducing and refuting opposing arguments. Fleming and Levie (1978) reported:

Introducing and refuting opposing arguments may be facilitative when: (a) the receiver is already familiar with the issue, (b) the receiver initially disagrees with the communicator's position, (c) the receiver . . . may seek out opposing arguments before making a decision, and (d) the receiver will hear the opposing viewpoint later. The cases in which ignoring opposing arguments is advisable are the obverse of the above. (p. 218)

Since the conditions noted by Fleming and Levie are unlikely in the diffusion of CNIM, no opposing arguments were stated via either diffusion channel.

A final dimension of the diffusion message involves the issue of message repetition. Some overlap in information was allowed to occur between the catalog and the diffusion channels, but neither the catalog nor the diffusion channels contain internal repetition. While the catalog could have been read more than once by a receiver, resulting in additional repetition, it is unlikely that this would occur.
systematically within the print or exchange modes. Furthermore, if this form of repetition did occur, receiver understanding of effective (correct) utilization would not be affected, as this information is not transmitted via the catalog.

Summary

This section has defined and described the two independent variables in this study, diffusion channel and organizational position of the receiver of diffusion information. Development of diffusion stimuli for the print and dyadic exchange diffusion channels was described.

Description of Dependent Measures

Cognitive effects and behavioral effects were shown in the review of selected literature to be among the most important effects of the diffusion process. Similarly, both individual receivers and social systems were shown in the review to be important diffusion targets for educational innovations. Therefore, the procedures implemented in this study were designed to measure two types of effects of the diffusion process—cognitive effects and behavioral effects—upon two types of receiver units: (a) individual receivers of diffusion information, and (b) the social system which constitutes the adopting unit. Cognitive effects of the diffusion process are assessable by a measurement of receiver
understanding of the principles of effective utilization of CNIM. Behavioral effects of the diffusion process are assessable by a measurement of the number of requests for CNIM materials placed by the aggregate of individuals in the receiver's social system, i.e., the adopting unit. Each dependent measure is described in this section.

Receiver Understanding of CNIM

The cognitive effect measured is receiver understanding of CNIM. Receiver understanding of an educational innovation means, in part, that the innovation must be utilized for its intended purpose. In the case of a media service such as CNIM, consideration must be given to the inherent principles of effective media utilization. These two standards of quality are reflected in the measure of receiver understanding as a dependent variable.

In order to measure the ways in which receiver understanding of CNIM was affected by the independent variables, it was necessary to devise an instrument which measured receiver's knowledge of effective utilization of CNIM. Such a knowledge test allowed for measurement of the impact of the independent variables upon both those who did access (utilize) the service and those who had not yet done so.

The knowledge test was presented to receivers of diffusion information as an evaluation instrument which would help CNIM administration evaluate individual items in the
collection. The instrument, so presented, did not pose a threat to receivers of diffusion information. Thus, this instrument was able to function as a plausible feedback instrument for administration of CNIM while it would also measure respondent understanding of CNIM.

The instrument contained 10 multiple-choice items. Each item contained one "best" utilization of CNIM (correct response). The item also contained one or two foils which reflected a utilization which violated the purpose of CNIM as a professional development service. CNIM has been designed to fill a need for statewide professional development media. If it is used with groups for which it is not intended, such as with students, parents of students, or community groups, then it cannot adequately fulfill the purpose for which it was created. Therefore, choice of an alternative which reflects utilization of the service for purposes other than professional development or inservice education for teachers is an incorrect choice, no matter how laudable or appealing the intended choice may be.

One or two other foils were also presented in each item of the knowledge test which reflected a violation of inherent principles of effective utilization of instructional media. The principles which are violated most frequently, and thus appear most often in the items, are those which require that media items be selected to support and facilitate systematically planned instructional goals and objectives and that
media be used as part of a well-designed instructional effort rather than be asked to stand alone. If media items are selected first, before instruction is planned, or if a media item is used as "filler" at a meeting, or if media items are utilized out of context, then principles of media utilization have been violated. The items on the measurement instrument are designed to determine the degree to which the receiver of diffusion information understands the appropriate utilization of CNIM.

A fourth alternative of each item on the instrument allowed the target to respond, "I would not utilize this media item." The receiver of diffusion information was also asked to explain why this alternative was chosen. A blank line was provided for this purpose. In addition to lending credibility to the alleged purpose of the instrument (feedback about media items), this response would allow for assignment of a positive quantitative score for the item if the explanation did indeed reflect understanding of the purpose of CNIM.

A fifth alternative of each item was labeled "Other." This alternative also required the receiver of the diffusion information to elaborate if this alternative were chosen, and a blank line was provided. The elaboration would be scored in the same way as the fourth alternative.
Pilot Test

This instrument was pilot-tested with several individuals who were similar to the two designated receivers of diffusion information. Pilot-tested receivers of diffusion information received information about the nature of CNIM and its effective utilization before completing the pilot instrument. The principal investigator communicated this information to half of the pilot respondents via the dyadic exchange channel. This was similar to Level One of the channel independent variable. The other half of the pilot respondents received the information via the print channel which simulated Level Two of the independent variable diffusion channel.

Some pilot respondents were asked to "think out loud," so that the principal investigator was able to derive insight into the interpretation of the various item alternatives. Twenty items were pilot-tested and, on the basis of the results, 10 were selected to comprise the instrument which measured the dependent variable "receiver understanding of the innovation." The stem of the items which were selected presented CNIM listings which were reasonably recent, educationally attractive, and technically attractive, i.e., color motion pictures of a reasonable length.
The instrument was sent to each of the 40 receivers of diffusion information via the REMC delivery system. Each instrument was numbered to allow for follow-up. A cover letter (see Appendix B) explained the purpose of the instrument, to provide CNIM administrators with evaluative feedback about the individual media items in CNIM. The cover letter was signed by Warren Lawrence, REMC 12 Director, as well as by the principal investigator. The principal investigator was titled "REMC 12 Media Consultant" in the cover letter. The principal investigator communicated information about CNIM and its effective utilization to all receivers of diffusion information, to 20 via dyadic exchange and to 20 via print channel. Therefore, the receivers of diffusion information should have recognized the investigator's name from the cover letter and his connection with REMC 12 and CNIM.

The receivers of the diffusion information who had not returned the measurement instruments within 2 days of the "date due" indicated on the cover letter were contacted by the principal investigator by telephone. The principal investigator asked if the receiver had indeed received the diffusion information. Those who said "no" were sent a duplicate packet. Those who said "yes" were asked if they had filled it out and returned it. Those who said "yes" to the subsequent question were thanked. Those who indicated
that they had not yet returned the material were asked if they would please do so. All subjects replied in the affirmative to this request that they fill out and return the questionnaire.

Utilization

The behavioral effect measured in this study was the number of requests for CNIM materials placed by individuals in the receivers' social systems. These requests constitute utilization of the innovation. Measurement of utilization of the innovation provides data indicative of the impact that the innovation had upon the social system.

Requests for CNIM materials were placed via toll-free telephone calls to CNIM headquarters at REMC 9. Since these calls could be placed by any professional educator who knew the phone number, it was necessary to include all individuals in the receiver's social system when measuring utilization. If the receivers indeed fulfilled the request in the message to tell all educators in their buildings, then each member of the social system could access the CNIM materials. The actual telephone request could have been made by the receiver of diffusion information for another individual in the social system or, conversely, by another member of the social system for the receiver of diffusion information.

The orders were received by CNIM clerical personnel at REMC 9, and a written record was established for each request.
for a media item. This written record was transferred to the principal investigator as part of the agreement between the principal investigator and the director of REMC 9. Since media items were to be mailed to educators' school buildings, it was necessary for educators to provide the name and address of their district and building. The principal investigator was therefore able to identify unobtrusively the treatment group to which the educator had been assigned.

CNIM clerical personnel logged the ordering information in writing before attempting to fill an order so that attempts to order media could be included in the quantity of utilization count even if, for any reason, the order could not be filled. Any attempt to access a CNIM media item by an individual in a receiver's social system was counted as a utilization for the treatment group to which the receiver of diffusion information was assigned. For example, if a CNIM media item was ordered by a teacher who was served by a media professional who had received information via the dyadic exchange channel, then one utilization was counted for that subject in treatment Group 1. The four treatment groups were then compared in terms of the mean utilization of CNIM.

**Technical Quality**

In this section, technical quality of the measurement instrument used to measure receiver understanding of CNIM
will be discussed. All attempts at measurement must be concerned with the technical quality of the instrumentation. Specific foci of this concern are the reliability and validity of the measurement instrument.

Internal consistency reliability for the instrument used in this study was drawn off the data from the study and will be presented with results. Validation of the instrument for the purposes for which it is used in this study has taken two forms. First, three content reviews by experts (the REMC 12 director, the REMC 9 director, and the CNIM coordinator) were used to check content validity. These reviews took place after the 20 pilot items were written and prior to the selection of the 10 items which were used in the instrument. The reviewers' input was one factor used to select the final 10 items. A second form of validation of the instrument was construct validity, which was accrued by the test of the major hypotheses of the study.

Technical quality was not assessed for utilization of CNIM because the data were an actual count of the number of requests for CNIM materials rather than a self-report measurement instrument. The exact nature of the utilization data is described in Chapter IV.

Treatment Groups

This section describes the assignment of REMC 12 school districts into four treatment groups. The procedure allowed
for investigation of the impact of two independent variables, diffusion channel and organizational position of the receiver of diffusion information, upon the dependent variables, receiver's understanding and utilization of CNIM by individuals in the receiver's social system. This procedure also allowed for the control of such potential contaminants as subject's age, source-receiver relationship, internal communication patterns of individual social systems, etc. For example, prior relationships between REMC 12 and the various receivers of diffusion information would be expected to vary from positive to negative. However, the use of randomization in the assignment of these receivers (and their organizations) to treatment groups would prevent these relationships from varying systematically with the independent variable levels. Each of the four treatment groups would consist of some receivers/organizations which had very positive prior relationships with REMC 12, some receivers/organizations which had predominantly neutral prior relationships with REMC 12, and some receivers/organizations which had predominantly negative prior relationships with REMC 12. Each treatment group thus contained a proportion of each type of source-receiver relationship which was approximately equal to the proportions of that type of relationship with REMC 12 which existed in the total receiver population.

Another example of a variable which is representative in each group in the study is provided by the variability
in the internal communication patterns of the various receivers' social systems. Some receivers of diffusion information may formally and systematically communicate the diffusion information to other individuals in the social system, following optimal methods of organizational communication including systematic message design, etc. Other receivers of diffusion information may communicate the diffusion information to other individuals in the social system haphazardly. Still other receivers of diffusion information, for one reason or another, may not communicate the diffusion information to other individuals in the social system at all, even if they are asked to do so by those who have transmitted the diffusion information to them. Random assignment of receivers/organizations to treatment groups will prevent the variability which exists in these internal communication patterns from contaminating the study. Each treatment group will consist of approximately the same proportion of each of the types of internal communication patterns as exists in the total receiver/organization population. Therefore, random assignment of receivers/organizations to treatment groups allows for the isolation of the effects of the independent variables upon the dependent variables in this study.

Each of these four groups represents a unique diffusion pattern which is created by crossing the two diffusion channels with the two receivers of diffusion information. Figure 1 illustrates this assignment to groups.
RECEIVERS OF DIFFUSION INFORMATION

LEVEL ONE
Building Media Professional

LEVEL TWO
Building Principal

<table>
<thead>
<tr>
<th>LEVEL ONE</th>
<th>LEVEL TWO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyadic Exchange/ Media Professional Group 1,1</td>
<td>Dyadic Exchange/ Principal Group 1,2</td>
</tr>
<tr>
<td>Print/ Media Professional Group 2,1</td>
<td>Print/ Principal Group 2,2</td>
</tr>
</tbody>
</table>

Figure 1
Display of Group Designation
Subjects and Treatment Groups

This subsection describes the techniques used to assign subjects to treatment groups. The assignment was a two-part process. First, REMC 12 school districts were assigned to one of the four treatment groups. Secondly, units of analysis were selected from each district. Each of these processes is described in detail.

Assignment of districts to treatment groups. REMC 12 serves 41 public school districts. Of these, 40 were utilized in this study. The smallest district was dropped to allow for assignment of an equal number of districts (10) to each of the four treatment groups. The 40 districts were arranged in rank order, according to the number of students in the district, and then divided sequentially into blocks of four. Random number tables were then used to assign one district from each block to a treatment group. This resulted in four treatment groups, with 10 school districts in each. Thus, this blocking technique allowed for control of another potential contaminant, the size of the school district. The size of the school district was formally controlled because of its potential power as a contaminating variable. Size of district is related to utilization patterns and staffing patterns. Staffing patterns in this study are related to the unit of analysis.

Identification of units of analysis. The dependent
variables in this study are selected cognitive and behavioral
effects of two diffusion variables upon the individual
receivers of diffusion information and also upon the individ­
uals within the receiving social system. Because of the dual
nature of the receiving population (individual receivers and
social systems as receivers), two distinct units of analysis
are necessary. These two units of analysis are: (a) the
individual receiver, and (b) the social system, i.e., indi­
viduals within the receiving social system. These units of
analysis were identified using a four-step procedure. The
first step was the assignment of a number to the buildings
within a district. The second step was the use of a random
number table to select a building. The third step was the
identification of the receiver of diffusion information who
served that building, either the building principal or the
building media professional, depending on previous assign­
ment. The fourth step was the identification of the individ­
uals in that receiving social system. This was necessary
for the identification of the social system unit of analysis.
Often, these individuals were all assigned to a single
building. In the smaller rural districts, the unit of anal­
ysis consisted of individuals in two or even three buildings.
Table 1 illustrates the receivers of diffusion information
in each treatment group who were assigned to a given number
of buildings. As the table shows, the use of district size
as a blocking variable ensured that the groups were
Table 1
Number of Receivers Assigned to a Given Number of Buildings

<table>
<thead>
<tr>
<th>Assigned Number of Buildings</th>
<th>Media Professionals</th>
<th>Principals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Print 1,2</td>
<td>Dyadic 1,1</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

cmparable relative to the number of buildings for which the receivers were responsible. Simple random assignment might not have produced this similarity.

Table 2 indicates the distribution of receivers in each group, and the number of individuals in their social system is indicated in the left column. Only 4 receivers are

Table 2
Number of Units of Analysis Which Contain a Given Number of Individuals

<table>
<thead>
<tr>
<th>Number in Social System</th>
<th>Media Professionals</th>
<th>Principals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Print 1,2</td>
<td>Dyadic 1,1</td>
</tr>
<tr>
<td>40+</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>35-39</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>30-34</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>25-29</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>20-24</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>15-19</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

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responsible for more than 40 practitioners, while 12 receivers are responsible for between 30 and 34 practitioners. Only 4 receivers have responsibility for 15-19 practitioners. The mean number of practitioners for which a receiver of diffusion information is responsible is 29.7.

The mean number of practitioners served by a receiver in Group 1,1 (media professional/dyadic exchange) is 31.8. The mean number of practitioners served by receivers in Group 1,2 (media professionals/print) is 31.6. The mean number of practitioners served by receivers in Group 2,1 (principals/dyadic exchange) is 30.8. The mean number of professionals served by receivers in Group 2,2 (principals/print) is 24.5.

Analysis of Dependent Measures

Two analyses of variance were performed to test the following: (a) the statistical significance of the differences between means of scores on the questionnaire which measured receiver understanding of effective utilization of CNIM, and (b) the statistical significance of the difference between mean utilizations by individuals in the receivers' social systems. The research hypotheses were presented at the beginning of Chapter III. The null hypotheses are presented in Chapter IV, as are the results of the analyses of variance.
Summary

The procedures which were described in this chapter were designed to test the major hypotheses of the study. These procedures were designed to isolate the effects of the independent variables, diffusion channel and organizational position of the receiver of diffusion information, upon the dependent variables, receiver understanding of effective utilization of CNIM and utilization of CNIM by individuals in the receivers' social systems. Potentially contaminating variables such as prior source-receiver relationships and internal organizational communication patterns of the receivers' social systems were controlled via a random assignment of receivers/organizations to treatment groups. School district size was used as a blocking variable.

Units of analysis were identified which allowed for the investigation of the effects of the independent variables on the two types of receivers in the diffusion process, individuals and social systems. These two targets of the diffusion process combine with the two types of selected effects, cognitive effects and behavioral effects, to comprise the two types of dependent variables. The application of two-way analyses of variance to test the statistical significance of the data generated by these procedures produced results which are described in Chapter IV.
CHAPTER IV

RESULTS

This chapter is organized into three sections. The first section consists of a discussion of the operationalization of the independent variables, with an emphasis upon procedural difficulties. The second section consists of a discussion of the measurement of the dependent variables. The third section describes the results of an analysis of variance of the dependent variables.

Operationalization of Independent Variables

The two independent variables in this study are diffusion channel and organizational position of the receiver of diffusion information. The diffusion channel variable consists of two forms: dyadic exchange and print. The organizational position of the receiver of diffusion information consists of either (a) building principal or (b) building media professional. Operationalization of the channel independent variable is described here, since it was a manipulated variable.

Dyadic Exchange

The dyadic exchange diffusion channel consists of a face-to-face consultation between the principal investigator
and the receiver of diffusion information. The dyadic exchange was arranged 1 week in advance via a telephone call from the principal investigator to the receiver of diffusion information. If the receiver was unavailable, the principal investigator re-placed the call. In each instance, the principal investigator was able to successfully arrange a dyadic exchange. Each dyadic exchange was scheduled so that travel from one school to another by the principal investigator was possible. The dyadic exchange independent variable consisted of a total of 20 consultations and was completely administered between October 1 and October 12, 1979. In addition to geographic considerations affecting travel time, the dyadic exchanges were scheduled so that no more than two receivers of diffusion information who occupied a common organizational position were scheduled consecutively, so that no systematic bias would result from all of the subjects in one treatment group being treated first.

After each dyadic exchange, the principal investigator made a tape recording which described the events surrounding the consultation. Two dyadic exchanges differed substantially from the procedures outlined in Chapter III. Those two dyadic exchanges are described here. One building principal was forced to substitute for a teacher when his attempts to employ a substitute teacher were not successful. He was in the classroom when the principal investigator arrived in the building for the dyadic exchange. The
building secretary informed the principal that the principal investigator had arrived for the appointment. The classes changed 45 minutes later, and this enabled the principal to keep the appointment. The rest of the exchange proceeded as outlined. The other deviation from the routine procedures occurred when a media professional who served more than one building was not at the building where the dyadic exchange was scheduled. The principal investigator was so informed and given directions to the building where the media professional was working. The principal investigator drove to that building and the dyadic exchange proceeded as outlined, 20 minutes later than planned. Thus, even deviations from planned procedure occurred equally in the treatment groups.

One dyadic exchange channel attribute is the capacity for interaction between linking agent and the receiver of diffusion information. A common form of that interaction consists of questions about the innovation. In order to avoid systematic variance in the message resulting from such questions, the message was carefully pilot-tested and questions which were frequently asked in the pilot test were incorporated into the message prior to communication with receivers in the study. As a result, only 17 questions were asked during administration of the dyadic exchange channel. Of these 17 questions, 8 were questions which were part of the diffusion message, but were asked prior to their treatment in the message. Three questions asked if specific types
of items were available in the catalog, and three asked about procuring catalog items for use with nonprofessional audiences such as parents and students. One receiver asked for additional catalogs, one asked how the materials were selected, and one asked how much travel time should be allowed for CNIM (Cooperative Network of Inservice Media) materials. While answers to these questions do constitute some message variation, this variation was not systematic, i.e., it did not occur only with principals nor did each receiver in the dyadic exchange channel ask a question.

Print

The print form of the diffusion channel independent variable consists of a packet which contains a form letter and a CNIM catalog. This packet was sent to the organizational position of the receiver of diffusion information, i.e., either to the building principal or to the building media professional. These 20 packets were delivered by the REMC (Regional Educational Media Center) 12 delivery system during the week of October 1-5. REMC 12 delivery personnel assured the principal investigator that the receivers did receive the packets without exception. Since no subject returned the measurement instrument indicating that they did not receive the packet, delivery may be assumed.
The two dependent variables which were measured in this study are receiver's understanding of CNIM and utilization of CNIM by practitioners in the receiver's building(s). Measurement of each of these variables is described here.

Receiver Understanding of CNIM

Receiver's understanding of CNIM was measured by a 10-item instrument developed by the principal investigator. The instrument is described in detail in Chapter III and is included as Appendix C. Instrument reliability and some individual item characteristics are reported here.

Description of the instrument. The principal investigator developed an instrument which measured receiver's understanding of CNIM.

Of the 40 instruments distributed, 33 were returned to the principal investigator and subsequently provided the data reported here. Those 33 instruments included 9 of 10 from Group 1,1 (dyadic exchange/media professional) and 8 of 10 from each of the other three groups. The number of write-in options utilized by each group is shown in Table 3.

The number of instruments returned by each group is indicated, as is the number of total items completed on those instruments. The number of write-in options (options d and e) selected is also indicated for each group. While
Table 3
Utilization of Write-In Options

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Media Professional</th>
<th>Principal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Print</td>
<td>Dyadic</td>
</tr>
<tr>
<td>Instruments returned</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Items answered</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Option d selected</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Option e selected</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Write-in options scored &quot;correct&quot;</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

the write-in options constituted 40% of the options available to the respondents, use of the options constituted less than 15% of selected responses (50 selections out of 330 possibilities). Most of the write-in responses were directed toward issues which were irrelevant for this study, such as the age of the media item or the quality of the catalog annotation. Those few which could be scored as "correct," i.e., "right," are indicated in Table 3. Items in which more than one alternative were selected were counted as incorrect, as the directions instructed the respondents to select only one option and, in any case, two selected alternatives represent at least one misuse of the media.

Instrument Reliability

The overall reliability for the 10-item instrument was assessed via an interclass correlation, coefficient alpha.
This measure of internal consistency yielded a reliability coefficient of .54. The reliability coefficient for each of the four groups is presented in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Alpha Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyadic exchange/media professional</td>
<td>.21</td>
</tr>
<tr>
<td>Print/media professional</td>
<td>.43</td>
</tr>
<tr>
<td>Dyadic exchange/principal</td>
<td>.81</td>
</tr>
<tr>
<td>Print/principal</td>
<td>.41</td>
</tr>
<tr>
<td>Overall</td>
<td>.54</td>
</tr>
</tbody>
</table>

The building media professionals who received diffusion information via the dyadic exchange diffusion channel produced an internal consistency reliability coefficient of .21, and those who received diffusion information via the print diffusion channel produced a reliability coefficient of .43. The building principals who received diffusion information via the dyadic exchange diffusion channel produced a reliability coefficient of .81, and those who received diffusion information via the print diffusion channel produced a reliability coefficient of .41.

Reliability was not computed for the utilization dependent variable because those data are a computer generation of actual, rather than self-report, data. Thus, there
is no way to determine the extent to which these data will generalize.

**Utilization of CNIM**

Utilization of CNIM was measured by counting the requests for CNIM materials placed by individuals in the receivers' social systems. Requests were placed via toll-free telephone to CNIM headquarters at REMC 9. The telephone requests were recorded by CNIM clerical personnel. Information recorded included: (a) name of user, (b) school mailing address, (c) item order number, (d) type of medium, (e) title, (f) use date, and (g) comments. The comments noted whether the request was filled. A total of five requests for CNIM materials was recorded for individuals in Region 12 during the study. Of these requests, three were placed by building principals, and two were placed by building media professionals. Thus, only receivers of diffusion information placed requests for CNIM materials, although they may have been asked to do so by other individuals in their social systems.

**Results of Analysis of Dependent Measures**

**Understanding of CNIM**

A two-way analysis of variance was performed to determine the effects of diffusion channel and position of the
receiver of diffusion information and a combination of the
two on receiver understanding of the principles of effective
utilization of CNIM.

The null hypotheses are as follows:

No difference exists between the mean of the
total scores of the receivers of diffusion
information who received information via the
dyadic exchange diffusion channel and the mean
of the total scores of the receivers of diffu­sion information who received information via
the print diffusion channel.

No difference exists between the mean of the
total scores of the receivers of the diffusion
who hold the position of building principal
and the mean of the total scores of the
receivers of diffusion information who hold
the organizational position of building media
professional.

There is no interaction effect between diffusion
channel and organizational position of the
receiver of diffusion information on the total
score.

The results of the analysis of the total scores are pre­
sented in Table 5; Table 6 shows the mean and standard
deviation for each group.

Because of the relatively small number of subjects in
this study (40), the reasonable level of significance is .10.
The mean scores of the two groups that received the dyadic
exchange diffusion channel (media professionals, 5.55;
principals, 6.75) are higher than the mean scores of the two
groups that received the print diffusion channel (media pro­
fessionals, 5.37; principals, 4.75). The difference in
these mean scores is 1.82. This figure represents nearly a
Table 5

Two-Way Analysis of Variance for Total Scores on Instrument Measuring Receiver Understanding of Cooperative Network of Inservice Media

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>9.33</td>
<td>1</td>
<td>9.33</td>
<td>2.09</td>
<td>.16</td>
</tr>
<tr>
<td>Receiver</td>
<td>.79</td>
<td>1</td>
<td>.79</td>
<td>.18</td>
<td>.68</td>
</tr>
<tr>
<td>Channel by receiver</td>
<td>6.18</td>
<td>1</td>
<td>6.18</td>
<td>1.53</td>
<td>.23</td>
</tr>
<tr>
<td>Residual</td>
<td>129.10</td>
<td>29</td>
<td>4.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>145.88</td>
<td>32</td>
<td>4.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6

Group Means and Standard Deviations for Total Scores on Instrument Measuring Receiver Understanding of Cooperative Network of Inservice Media

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyadic exchange/media professional</td>
<td>9</td>
<td>5.55</td>
<td>1.87</td>
</tr>
<tr>
<td>Print/media professional</td>
<td>8</td>
<td>5.37</td>
<td>2.60</td>
</tr>
<tr>
<td>Dyadic exchange/principal</td>
<td>8</td>
<td>6.75</td>
<td>1.92</td>
</tr>
<tr>
<td>Print/principal</td>
<td>8</td>
<td>4.75</td>
<td>1.98</td>
</tr>
</tbody>
</table>

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20% difference in mean scores on the 10-item instrument, i.e., 2 items. No statistically significant differences are indicated which are attributed to varying receivers of diffusion information. There is no statistical evidence of an interaction effect, although it is interesting to note the substantial discrepancy in the reliability coefficient generated by the building principals who received the diffusion information via the dyadic exchange diffusion channel and the other three groups, particularly the media professionals who received the diffusion via dyadic exchange (see Table 4). Also, the principal groups have the highest and lowest scores of the four groups, though these mean scores are not statistically significant.

**Utilization of CNIM**

A two-way analysis of variance was performed to determine the effects of diffusion channel and position of the receiver of diffusion information and a combination of the two on utilization of CNIM by individuals within the social system of the receiver of diffusion information, i.e., the unit of analysis as discussed in Chapter III.

The null hypotheses are as follows:

**No difference exists between the mean of the total number of requests for CNIM materials by individuals in the social systems of receivers of diffusion information who received diffusion information via the dyadic exchange diffusion channel and the mean of the total number of requests for CNIM materials by individuals in the social systems of**
receivers of diffusion information who received diffusion information via the print diffusion channel.

No difference exists between the mean of the total number of requests for CNIM materials by individuals in the social systems of receivers of diffusion information who hold the position of building media professional and the mean of the total number of requests for CNIM materials by individuals in the social systems of receivers of diffusion information who hold the position of building principal.

There is no interaction effect between diffusion channel and organizational position of the receiver of diffusion information on the total number of requests for CNIM materials by individuals in the receivers' social systems.

Results of the analysis of the total number of requests for CNIM materials are presented in Table 7; Table 8 presents means and standard deviations.

Table 7

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>.04</td>
<td>1</td>
<td>.04</td>
<td>.16</td>
<td>.69</td>
</tr>
<tr>
<td>Receiver</td>
<td>.02</td>
<td>1</td>
<td>.02</td>
<td>.09</td>
<td>.76</td>
</tr>
<tr>
<td>Channel by receiver</td>
<td>.80</td>
<td>1</td>
<td>.80</td>
<td>3.16</td>
<td>.08</td>
</tr>
<tr>
<td>Residual</td>
<td>7.37</td>
<td>29</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8.24</td>
<td>32</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the data presented in Table 7, there exists a significant interaction effect between channel and receiver regarding the total number of requests for CNIM materials.
Table 8

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyadic exchange/media professional</td>
<td>9</td>
<td>.00</td>
<td>.000</td>
</tr>
<tr>
<td>Print/media professional</td>
<td>8</td>
<td>.37</td>
<td>.074</td>
</tr>
<tr>
<td>Dyadic exchange/principal</td>
<td>8</td>
<td>.25</td>
<td>.071</td>
</tr>
<tr>
<td>Print/principal</td>
<td>8</td>
<td>.00</td>
<td>.000</td>
</tr>
</tbody>
</table>

materials, i.e., utilization of CNIM by practitioners. This interaction effect is illustrated in Figure 2.

Individuals in the social systems of receivers who hold the position of building principal utilized the innovation three times when diffusion information was transmitted via the dyadic exchange diffusion channel, but not at all when diffusion information was transmitted to the receiver via the print diffusion channel. Individuals in the social systems of receivers who hold the position of building media professional utilized the innovation twice when diffusion information was transmitted via the print diffusion channel, but not at all when the diffusion information was transmitted via the dyadic exchange diffusion channel. The statistical analysis presented in Table 7 indicates that this interaction effect is significant at the .10 level. However, as mentioned above, the user in the social system in all cases was
the receiver himself/herself.

Summary

This chapter has presented the results of this study. Three major findings were described:

1. There is no statistically significant difference between the four groups in the study regarding receiver understanding of CNIM.

2. The measure of that understanding had vastly different reliability in the four groups.

3. There was an interaction effect between diffusion channel and diffusion receiver regarding the utilization of CNIM.
In Chapter IV, the findings of the study have been reported. A discussion of these results follows in Chapter V.
CHAPTER V
DISCUSSION

This chapter presents a discussion of the study and its findings. The discussion is organized into the following sections: (a) review of the problems and procedures, (b) interpretation of the findings, (c) implications for practice, and (d) areas for further study.

Review of the Problem and Procedures

The purpose of this study was to investigate the effects of various combinations of diffusion channels and receivers of diffusion information upon selected effects of the diffusion process. In order to investigate these variables, an educational innovation entitled the Cooperative Network of Inservice Media (CNIM) was diffused via one of two diffusion channels to one of two organizational positions designated as receivers of diffusion information. The two diffusion channels were dyadic exchange and print. The organizational positions of the receivers were building principal and building media professional.

The dyadic exchange form of the channel independent variable consisted of 20 face-to-face consultations between the principal investigator and the receivers of diffusion information. The dyadic exchanges were arranged and

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administered according to optimally effective professional practice. The dyadic exchange channel possesses a channel attribute which was not found in the print diffusion channel. This attribute was capacity for interactive communication.

The print form of the channel independent variable was also designed and administered according to optimally effective professional practice. The print independent variable consisted of a packet containing a form letter and a CNIM catalog. The packet and the form letter were addressed to the organizational position of the receiver of diffusion information and were delivered via REMC (Regional Educational Media Center) 12 delivery service.

The organizational positions of the receivers constitute the receiver independent variable in this study. The two forms of the receiver independent variable are the building principal and the building media professional. The building principal represents a "legitimate" basis of organizational power and authority to practitioners. The building media professional represents an "expert" basis of organizational power and authority to individuals in the social system. These two sources of organizational power and authority have been defined in the literature as the bases which are most effective in eliciting compliance.

The dependent variables in this study were two specific effects of the diffusion process: (a) receiver understanding of a complex educational innovation, CNIM; and (b) utilization
of the innovation by individuals in the receiving social system.

After being placed in rank order according to size, each school district in Region 12 was randomly and sequentially assigned to one of four treatment groups. This procedure controlled for such potential contaminants as size of district, source-receiver relationships, etc. One building was randomly selected from each district, and the building was identified. All of the individuals in that receiver's social system formed the unit of analysis for the utilization dependent variable. A 10-item instrument was developed to measure receiver understanding of the innovation. The instrument was pilot-tested, and content validity was established. Reliability information pertaining to the instrument was drawn off the data provided by the study. A two-way analysis of variance was used to test the statistical significance of the differences in the means of receivers' scores on the instrument.

Interpretation of Findings

This section will present an interpretation of the findings presented in Chapter IV. These interpretations are organized according to the dependent variables. These dependent variables are (a) receivers' understanding of the innovation and (b) utilization of the innovation by individuals in the receivers' social systems. The effects of each
independent variable upon these dependent variables will be considered.

Receiver Understanding of CNIM

No evidence was found relative to the effects of the organizational position of the receiver of diffusion information upon receiver understanding of CNIM. The $F$ ratio resulting from an analysis of variance for the receiver variable has a probability of .68. These data clearly allow for the inference that the varying effects of the receivers of diffusion information were not statistically significant.

The $F$ ratio resulting from an analysis of variance for the diffusion channel variable has a probability of .16. Since the level of significance set for data in this study is .10, the diffusion channel did not have a statistically significant differential effect upon receiver understanding of CNIM. However, there was a nearly 20% difference in mean scores on the instrument as a whole between the two levels of this variable. This could indicate that differences do in fact exist, but that the small sample size in this study prohibited its verification. The relatively small sample size (40 receivers of diffusion information, 33 of whom returned instruments) could account for the failure to detect such a differential effect if one does exist.
Utilization of CNIM

No evidence was found relative to the main effect of the organizational position of the receiver of diffusion information upon utilization of CNIM by individuals in the social system of the receiver of diffusion information. The F ratio resulting from an analysis of variance for the receiver variable has a probability of .69. These data allow for the interpretation that the position of the receiver of diffusion information had no statistically significant differential effect upon practitioner utilization of CNIM. Likewise, no evidence for the diffusion channel having a differential effect upon practitioner utilization of CNIM was found. The F ratio resulting from an analysis of variance for the channel variable has a probability of .76. These data allow for the interpretation that the diffusion channel had no statistically significant differential effect upon practitioner utilization of CNIM.

There was, however, evidence of a statistically significant interaction effect between diffusion channel (dyadic exchange or print) and position of the receiver of diffusion information (either principal or media professional). An analysis of variance yields an interaction effect F value of 3.16 which has a probability of .09. Because of the small sample size, the level of rejection of the null hypothesis was set at .10 in this study. This allows for rejection for
the following null hypothesis:

There is no interaction effect between diffusion channel and organizational position of the receiver of diffusion information on the total number of requests for CNIM materials by individuals in the receiver's social system.

The building principals responded more to the dyadic exchange diffusion channel, while the building media professionals responded more to the print diffusion channel. The literature noted that opinion leaders were more likely to have outside contacts than were other members of the organizations (Rogers & Shoemaker, 1971). The type of contact was not specified, however. It is possible that the media professional receives virtually all outside contacts via the print channel and is accustomed to responding to information presented via that format. The building principal, however, may receive so many communications that he/she is able to respond only to those which have extraordinary impact such as dyadic exchanges. A word of caution is in order, however, because the number of utilizations of CNIM was small possibly due to the time constraints of this study and also to other factors discussed in the following section of this chapter.

Implications for Practice

The results of this study indicate generally low receiver understanding of the innovation being diffused and generally low utilization of that innovation. While these results are disappointing, they are not surprising for the
following reasons.

Receiver understanding of this complex educational innovation was measured by a 10-item instrument. Each item in this instrument presented three educationally desirable alternatives, only one of which adhered to the principles of utilization of CNIM. An educator who did not possess and apply a thorough understanding of those principles would find all three alternatives to be appealing. It is possible that a thorough understanding of a complex educational innovation may not be acquired through a single diffusion contact even if that contact is well designed and implemented. Understanding the correct use of educational media, per se, may have to be acquired before the principles of correct use are applied in a specific situation.

Utilization of CNIM by individuals in the receivers' social systems was measured by counting the requests for CNIM materials from those receivers. A time constraint imposed by the study was one factor which limited practitioner utilization of CNIM. This time constraint was necessary in order to prevent the contamination of multiple treatments which would have been inevitable if the study had been allowed to continue over a longer period of time. This is a regrettable, but general, problem of field experiments.

Another factor which limited utilization of CNIM was the practice of many school districts of formulating professional development plans a year in advance. These districts
may, in fact, utilize CNIM in the professional development activities of the year following the diffusion process in this study. However, this implies a greater understanding of correct use than was shown on the knowledge variable.

The low utilization total in this study may indicate that multiple diffusion contacts may be required to move beyond awareness of the existence of a complex innovation to an understanding of it and the behavioral event of an actual utilization. It is possible that print and dyadic exchange, used redundantly, may be more effective than either used alone.

Earlier in this study, two theoretical perspectives on the diffusion process were described. These theoretical perspectives, which formed the basis for the diffusion strategies utilized in this study, were the RD & D perspective and the S-I perspective. The directional flow of diffusion information in these perspectives is essentially one-way, from outside the practitioner organization to inside that organization. The directional flow of diffusion information in two other perspectives, the problem-solver and linkage perspectives, is two-way, originating from within the practitioner organization and traveling to an outside organization and back. These perspectives require multiple diffusion contacts and develop a high level of motivation on the part of the practitioner organization. Use of these theoretical perspectives in the formulation of a diffusion strategy may
provide the additional diffusion contacts and increased motivational level which would allow for a more successful diffusion of a complex educational innovation such as CNIM. Linking agents who formulate such diffusion strategies should consider use of the strengths of all four theoretical perspectives.

Another implication for practice generated by the data resulting from this study is that of the primacy of personal contact. While the dyadic exchange diffusion channel did not have a statistically significant differential effect upon receiver understanding of CNIM, the data indicated that it did have a substantial impact upon the diffusion process.

Areas for Further Study

Two questions are implied by the data resulting from this study. These questions are described in this section because they constitute areas for further study. The two questions are as follows:

1. Can the statistically significant interaction effect be duplicated?

2. Would stronger treatments show a significant difference in the dependent variables?

Such stronger treatments could take the form of multiple treatments or alteration of the directional flow of the diffusion contacts. The interaction between diffusion channel and receiver of diffusion information constitutes an area for further study, for two reasons: first, because the data
on utilization indicate a statistically significant interaction effect between diffusion channel and receiver of diffusion information. Secondly, the reliability coefficients for the instrument measuring receiver understanding of CNIM revealed vastly different reliability data for the four groups in the study and provide further evidence for the existence of an interaction effect. The reliability coefficient for the building principals who received information via the dyadic exchange channel was vastly higher than the mean of the other three reliability coefficients. Conversely, the reliability coefficient for the building media professionals who received diffusion information via the dyadic exchange was much lower than the mean of the other three reliability coefficients.

The directional flow of information constitutes an area for further study because the major theoretical perspectives in the field are divided in terms of the most effective origin of the diffusion process. The proponents of the problem-solver diffusion process and the linkage diffusion process argue that the diffusion process must originate in the practitioner organization in order to generate the motivational level which precludes successful diffusion of an educational innovation. Most diffusion strategies, including the one utilized in this study, focus upon a one-way, outside-in directional flow of diffusion information in spite of these theoretical perspectives. Further research
is needed which will determine if directional flow of diffusion information is a critical variable of the diffusion process.
APPENDICES
APPENDIX A

INITIAL LETTER TO RECEIVERS OF DIFFUSION INFORMATION
September 28, 1979

Dear Building Principal:

The enclosed catalog is your guide to an exciting, new media service from Michigan's REMCs. CNIM media items are now available for use by all Michigan educators.

The Cooperative Network of Inservice Media (CNIM) is described in detail on the inside of the front cover of the CNIM catalog. Please note the following characteristics of CNIM which we believe will help you use the service effectively:

1. CNIM has been established in response to a perceived need for professional development media. CNIM media items are designed to support the goals and objectives of professional development efforts. One should keep in mind when selecting CNIM materials that they are for teacher inservice education. Use of CNIM media items for other educational ends, such as for classroom instruction or with groups of parents, will limit the potential of this statewide service to meet the need for professional development media.

2. As with all instructional media items, CNIM materials should be selected to support the goals and objectives of a well-designed instructional process and should not be asked to "stand alone."

We would appreciate your assistance in making the educators in your building(s) aware of CNIM and procedures for its effective use.

Sincerely,

Howard Major, Media Consultant
CNIM Project

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November 26, 1979

Dear Building Principal:

We need your help!

REMC 12 is attempting to evaluate and improve the CNIM collection. By filling out and returning the attached questionnaire, you will help us appraise individual media items in the CNIM catalog.

It is not necessary for you to view the media items themselves. Please look in the CNIM catalog, find the media item referred to by each question in the questionnaire, and read the annotation which accompanies that listing. Indicate how you recommend that the media item be used by circling the letter corresponding to your recommended use of that media item.

The number in the upper right-hand corner of the questionnaire identifies you for follow-up purposes. Those who have not returned the questionnaire in two weeks will be recontacted.

Please use the enclosed envelope to return the questionnaire, via REMC delivery, on or before Tuesday, December 11, 1979.

We thank you for your prompt attention.

Sincerely,

Howard Major
Media Specialist

Warren J. Lawrence, Director
Regional Educational Media Center 12
APPENDIX C

COOPERATIVE NETWORK OF INSERVICE MEDIA
UTILIZATION QUESTIONNAIRE
CNIM MEDIA UTILIZATION QUESTIONNAIRE

No. __________

Directions: Circle the letter corresponding to the one best use of the given piece of media.

1. CNIM Catalog page #1 Media item #400156

Title: Career Development--A Plan for All Seasons

26 minutes color motion picture

Recommended use:

a. With teachers as part of a professional development program.

b. With adult learners, such as in a continuing education program.

c. With students, as part of a career education program.

d. I would not use this media item (explain): ______

_____________________________________________________

e. Other (specify): __________________________________

_____________________________________________________

2. CNIM Catalog page #2 Media item #400142

Title: Children of Promise

21 minutes color motion picture

Recommended use:

a. As part of an orientation program for students who have been selected to participate in a gifted and talented program.

b. With parents of gifted and talented students.

c. As part of a professional development workshop on working with gifted and talented students.

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d. I would not use this media item (explain): ______

________________________________________________________________________

e. Other (specify): _______________________________________________________
________________________________________________________________________

3. CNIM Catalog page #3 Media item #400078

Title: Early Recognition of Learning Disabilities

30 minutes color motion picture

Recommended use:

a. As part of a plan to help parents diagnose learning disabilities with their preschool children.

b. As part of a program to help teachers grow professionally.

c. As part of a program to help students in "regular" classrooms relate to mainstreamed students.

d. I would not use this media item (explain): ______

________________________________________________________________________

e. Other (specify): _______________________________________________________
________________________________________________________________________

4. CNIM Catalog page #4 Media item #400088

Title: Identity Society

28 minutes color motion picture

Recommended use:

a. To help students understand their social roles.

b. As part of an inservice to help teachers relate to students.

c. As part of the school social studies curriculum.

d. I would not use this media item (explain): ______

________________________________________________________________________

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5. CNIM Catalog page #5 Media item #400089
Title: Glasser on Discipline
28 minutes color motion picture
Recommended use:

a. As part of a program to help parents understand the school's perception of discipline.

b. As part of a program to help students adjust to school expectations.

c. As part of a program to help teachers deal with discipline.

d. I would not use this media item (explain): ______

e. Other (specify): ____________________________

6. CNIM Catalog page #6 Media item #400057
Title: Marc's World
20 minutes color motion picture
Recommended use:

a. As part of an effort to help teachers help students.

b. With students as part of the social studies curriculum, particularly psychology courses.

c. To help students who have been identified as having poor self-concepts.

d. I would not use this media item (explain): ______

e. Other (specify): ____________________________

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7. CNIM Catalog page #7  Media item #400154

Title: **Power of Positive Listening**

26 minutes  color  motion picture

Recommended use:

a. With students who do not listen well.

b. With students, as part of the social studies curriculum.

c. As part of a continuing listening skills program for teachers.

d. I would not use this media item (explain): ______

______________________________________________________________

e. Other (specify): __________________________________________

______________________________________________________________

8. CNIM Catalog page #8  Media item #400022

Title: **Reading to Remember**

16 minutes  B&W  motion picture

Recommended use:

a. As part of a professional development program for teachers.

b. With students who are having reading difficulties.

c. With parents of students who are having reading problems.

d. I would not use this media item (explain): ______

______________________________________________________________

e. Other (specify): __________________________________________

______________________________________________________________

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9. CNIM Catalog page #9  
Title: Specific Learning Difficulties in the Classroom  
23 minutes  color  motion picture  
Recommended use:  
a. With advanced students who are serving as tutors for other students.  
b. With parents of students who are having learning difficulties.  
c. As part of an inservice effort to help teachers diagnose learning difficulties.  
d. I would not use this media item (explain): ______  
   ____________________________________________________________  
e. Other (specify): ___________________________________________  
   ____________________________________________________________

10. CNIM Catalog page #11  
Title: Who, What, Where and Why of Authority  
29 minutes  color  motion picture  
Recommended use:  
a. With parents of students who have discipline problems.  
b. With teachers, as part of an approach to discipline skill development.  
c. With students who have discipline problems.  
d. I would not use this media item (explain): ______  
   ____________________________________________________________  
e. Other (specify): ___________________________________________  
   ____________________________________________________________

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