INFORMATION AS A BASIS FOR THE FORMATION OF ATTITUDES TOWARD AN INSTRUCTIONAL APPROACH

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ABSTRACT

INFORMATION AS A BASIS FOR THE FORMATION OF ATTITUDES TOWARD AN INSTRUCTIONAL APPROACH

By

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Purpose

This study was based on the assumption that the successful diffusion of educational innovations through higher education depends on the availability of a viable model of the process underlying change in the practices of individuals in higher education. Since current models of the change process are characterized by limited generalizability, a new perspective was proposed in this study. The purpose of the investigation was to examine the applicability of this perspective to the study of change in higher education. In specific terms, this study was intended to determine the degree to which the proposed model can account for variability in the use of an innovative teaching approach by faculty members in higher education.

Theory

The theoretical model of this investigation was drawn from the writings of Woelfel and Haller (1969, 1971a). It suggests that the behaviors of an individual faculty

member toward an innovation are determined by (1) his attitude toward the use of the innovation, (2) information he receives about the innovation from others, (3) independent observations regarding the innovation by the faculty member, and (4) social structural variables. The attitude (1) is assumed to be the most critical variable. The theory suggests that the attitude toward the use of a given innovation exerts direct causal influence on subsequent behavior. The attitude itself is viewed as an informational construct that is formed solely by informational processes. Factors 2, 3, and 4 above are assumed to affect the attitude insofar as they provide, filter, or control information. The Woelfel-Haller model argues that an individual's attitude will converge on the mean of all information received.

Method

The dependent behavioral variable in this research was the use of the competency-based approach to instruction, which was measured by an eight-item index. The remaining four theoretical factors were operationalized by means of forty-nine variables. All measures were incorporated into a self-report instrument. Using a survey procedure, data were obtained from 217 faculty members at Michigan State University. Linear regression techniques were used as the basic tool for data analysis.

Results

The independent variables emanating from the Woelfel-Haller model were found to account for 68 percent of the variance in the use of the competency-based approach to instruction. There was substantial evidence that attitude toward the use of the competency-based approach is the principal predictor of subsequent behavior. This attitude, in turn, could be predicted accurately (i.e., 62 percent of variance explained) on the basis of factors 2, 3, and 4 above. The results supported the theory's prediction that noninformational variables (i.e., social structural variables such as teaching experience and sex) have a determining effect on the dependent attitude only insofar as they expose the individual to different information.

Discussion

The findings were interpreted as (1) suggesting that the process underlying changes in teaching patterns can be accurately predicted by the Woelfel-Haller model; and (2) supporting the theory's central contention that a number of diverse sociological and psychological variables may be simultaneously examined in terms of the information they represent or control, and that information may be viewed as a "motor force" toward behavior. It was concluded that the results of this dissertation provide substantial evidence for the applicability of the Woelfel-Haller model to the study of change in teaching attitudes and behaviors in higher education.

INFORMATION AS A BASIS FOR THE FORMATION OF ATTITUDES TOWARD AN INSTRUCTIONAL APPROACH

By

Fritz Kramer

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TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

CHAPTER I

HIGHER EDUCATION AND THE NEED FOR A MODEL OF CHANGE

Introduction

In recent years, higher education has been challenged to devote increasing attention to such problems as serving a more diverse student population, reducing or holding constant cost while satisfying increased demands, and meeting the needs of a technological society that is changing at an accelerating rate. Such problems have prompted increased research on learning and teaching, including stepped-up attempts in higher education to harness the technology and techniques of the so-called second industrial revolution--the revolution of information processing and communication. As Reif (1974) observed, however, it is obvious that despite pressures for change in educational techniques and the existence of an emerging body of systematic knowledge about the processes of learning and teaching, traditional pedagogic models are not seriously questioned in higher education and continue to be utilized despite their shortcomings.

Institutions of higher education are not noted for their receptivity to change. Snow (1961), for instance, stated,

> In a society like ours, academic patterns change more slowly than any others. In my lifetime, in England, they have crystallized rather than loosened. I used to think it would be about as hard to change, say, the Oxford and Cambridge scholarship examinations as to conduct a major revolution. I now believe that I was over-optimistic (p. 186).

Educational reformer, Henry Wristen, struck a similar note of pessimism when he wrote,

> Reform easily exhausts the energies of its proponents. The stubborn, silent, but destructive effect of passive resistance is continuous, pervasive, and insidious. A change voted is merely a challenge to resistance; the vote is preliminary to the real battle (1959, p. 39).

Such observations support the growing contention among educators that although many new ideas are being promoted to meet today's challenges, the end result is little alteration in the corpus of education.

In attempting to understand such pervasive resistance, investigators have concentrated on two different units of response. First, there are those who have focused on the effects of various factors on change in the <u>educational institution</u> as a whole. Hefferlin (1971), for example, cited several factors that deserve attention in understanding the change process in institutions of higher education. One variable is that academic change is essentially organizational change, and that to understand its dynamics requires an understanding of academic organizations. Another factor is that change seems difficult because colleges, like other institutions, exist for the sake of order in human life.

They function to routinize interaction among people. Consequently, they are naturally and inherently antithetical to change. Another factor mentioned by Hefferlin is that collegiate reputations do not hinge on innovativeness in academic patterns. Instead, the highest status institutions are not noted for experimentation, but rather for admitting elite students and for quality performance of generally accepted programs.

Second, in studying change in higher education, researchers have also concentrated on individuals rather than on the institution as a whole (e.g., Evans and Leppmann, 1965; Lefever, 1972). By using individuals as units of response, these researchers have focused on the effects of intrapersonal, social structural, and organizational variables on attitude and behavior change of individual decision makers within the institutions under consideration. An implicit assumption of the latter approach is that every organizational change is linked to individual change, and that organizational change may be understood by explaining the process that underlies change in the practices of individual members of that organization. This dissertation concentrates exclusively on the individual as the unit of response.

Regardless of the unit of response with which one chooses to work, an understanding of the change process in higher education appears to be of great importance to anyone

who is attempting to promote change in academic patterns. This assertion is based on the underlying assumption of the present investigation, that the impact of change agents on their target system is always limited by their knowledge of the processes underlying change itself. That is, if the change agent in higher education is to be successful in bringing about the adoption of educational innovations, he needs to be able to identify relevant variables and their relative importance in creating change.

Statement of the Problem

The primary problem of this research is to determine what factors contribute to the variability in the degree of using a given educational innovation among faculty members at Michigan State University. The problem includes determining the relative importance of factors found to affect this variability. The educational innovation chosen to study this change process is a systematic approach to instruction, referred to as "the competency-based approach to instruction."

Perspective From Which the Problem Is Viewed

Recently, Woelfel and Haller (1969, 1971a) set forth a general theoretical formulation about the process that underlies the change in practices of individuals. Briefly, this is a communication theory that assumes that attitude is

exerting direct causal influence on subsequent behavior. Attitude is defined as an individual's conception of relations to objects. Since attitudes are defined as informational structures, the processes by which attitudes are formed and changed are those processes by which information about the individual's relationship to the object is communicated to him. The authors distinguished two such processes: information communicated to the individual by others and unassisted observations made by the individual. It is assumed that no information, from whatever source, is ever totally discounted, and that the resulting attitude is a simple linear aggregate of all information received about the attitude. The Woelfel-Haller model is presented in detail in Part II of Chapter II.

Using this formulation, Woelfel and Haller (1971a) accounted for 64 percent of the variance in high school students' educational aspirations. Mettlin (1970) replicated their results on a second sample with equal success. Guided by the same theory, Woelfel and Hernandez (1972) explained 80 percent of the variance in marijuana use, and nearly equivalent levels of success were recorded for attitude toward French Canadian Separatism (Woelfel, Woelfel, Gillham and McPhail, 1974) and cigarette smoking (Mettlin, 1973). Since the Woelfel-Haller formulation purports to be a general theory of change, its application in the area of educational change may produce similar results.

Purpose of the Study

The purpose of this dissertation is to evaluate the usefulness of the Woelfel-Haller theory in analyzing the change process in higher education. In specific terms, the study is designed to assess the degree to which independent variables emanating from the theoretical model help explain variability in the use of the competency-based approach to instruction among faculty members at Michigan State University. The theoretical independent variables are (1) the attitudes of faculty members toward the innovation, (2) information they receive about the innovation from others, (3) independent observations made by faculty members, and (4) social structural variables. An additional purpose of the study is to estimate the relative importance of the independent variables in determining the use of the competency-based approach.

The focus of the study is strictly on faculty perceptions, and should provide valuable information for understanding the innovation process from the perspective of individual members of an educational institution. The findings may also prove useful in the development of effective strategies to promote change in higher educational teaching practices.

The Innovation Under Study

In studying the change process in higher education, the investigation focuses specifically on the process

underlying changes in faculty behaviors toward the so-called competency-based approach to instruction. This particular dependent variable was selected as a vehicle for the study for two reasons.

First, change agents in higher education are concerned primarily with changing the process of learning and teaching. The writings of such educational reformers as Finn (1960), Hoban (1974), and Reif (1974) unanimously point to the necessity of diffusing through institutions of higher education a teaching approach that is referred to in this study as competency based. Thus, by selecting the competency-based approach as the dependent variable, the study will provide relevant information for change agents who are attempting to diffuse such a teaching approach among faculty members in higher education.

A second reason for selecting this dependent variable is that, in general, methods of instruction are decided by individual faculty members. Accordingly, the selection of a teaching approach as the dependent variable lends itself readily to the study of the process that accounts for variability in the practices of individual members of an educational institution.

The Competency-Based Approach to Instruction

A great many people have developed positions on learning that can be used as models by teachers, curriculum

designers, and developers of instructional materials. Included are the works of counselors and therapists (Rogers, 1951; Erikson, 1950), learning theorists (Skinner, 1957; Ausubel, 1963; Bruner, 1966), developmental psychologists (Piaget, 1952; Hunt, 1970), and educational philosophers (Dewey, 1916; Broudy, 1965). In addition, a host of curriculum development projects in academic subjects, specialists in group dynamics, and experimental schools (e.g., Summerhill) are further sources of potential teaching models. Each model presents a particular frame of reference--its views of man and what he should become. Thus, each model focuses on specific learning outcomes and favors certain ways of creating educational environments.

In their sourcebook on teaching models, Joyce and Weil (1972) concluded that, as a rule, teaching models tend to focus on a conceptual description of their goals, rationales, and advocated teaching environments. Generally, they do not provide the practitioner with operational specifications for the development of instructional materials and instructional interactions that will induce the learner to follow the phases of activity specified by the model. Nor do they present guidelines for the organization and management of other resources that must support the teaching process. Furthermore, since each model of teaching tends to focus on certain aspects of the teaching process at the cost of deemphasizing others, the practitioner in charge of the

total teaching process is left with the task of integrating a variety of teaching models into a meaningful whole.

In the last few years a type of educational engineering has begun to take shape, which consists of procedures and knowledge for designing and implementing instructional systems. Advocates of the educational engineering approach suggest that it provides a vehicle to analyze and design instructional systems, which allows the educational practitioner realistically to integrate and operationalize the various teaching models that are potentially available for use. Also, it is maintained that educational engineering enables educators optimally to coordinate all available resources in solving their educational problems.

Joyce and Weil (1972) identified three complementary streams of thought that have contributed to the educational engineering movement. The first stream, training psychology, came from research on complex training situations developed at least partly in reaction to the limitations of stimulus-response learning theory. Psychologists found that the available knowledge of human learning from the stimulus-response-reinforcement exercises of the learning laboratories was inadequate to permit the design of training components for more complex behaviors. Consequently, they turned to a new type of psychology, loosely known as "training psychology." Training psychology focuses on designing performance goals or tasks, breaking those tasks

into component tasks, and developing training components to ensure the achievement of each of the subcomponents. The entire learning situation is arranged into sequences which ensure that prerequisite learnings are achieved before more advanced ones. Like the behavior modification psychologists, training psychologists manipulate variables like reinforcement and feedback, but they also manipulate task definition and task analysis.

The second stream, cybernetic psychology, is based on the conceptualization of the learner in terms of a "cybernetic system." It conceives of the learner as an electronic system, a kind of machine capable of self-regulatory activity by means of obtaining and using information he gets from his environment (Smith and Smith, 1966). The cybernetic concepts of dynamic feedback and self-regulation provided essential additional knowledge for the design of training programs for complex behaviors.

The third stream of thought has been called "systems development." It grew out of a recognition that human behavior operates as part of an organizational system. This system includes not only the person who is behaving, but also the organization of which he is part, the machinery and communication systems, procedures for deploying the teaching staff, and the teaching procedures utilized. Since systems development focuses on the multiplicity of interdependent parts, the smooth coordination of these parts becomes its

central concern. Systems development identifies the components and their interrelationships, and in so doing provides the outline of management system requirements.

All three streams of thought "subscribe to the notion that we can describe an organism only in terms of its manifest behavior, and all three streams attempt to change the visible behavior of the organism in respect to a particular domain of functioning" (Joyce and Weil, 1972, p. 349). Thus, it is probable that the educational engineering approach is much more likely to serve as an operational structure for teaching models with a behavior modification orientation.

Educational engineering as it exists today is variously referred to as "educational technology" (Ely, 1972), "instructional development (Diamond et al., 1973), "systems approach" (Kaufman, 1968), or "the competency-based approach to instruction." For purposes of this research, the latter name is used.

The general competency-based approach to instruction has been formalized in a number of "models" (e.g., Banathy, 1968; Barson, 1967; Hamreus, 1968; Gerlach and Ely, 1970). Since the dependent variables used in this research are the attitudes and behaviors of members of the faculty toward a general competency-based approach to instruction, these models were heavily relied upon in deriving a more succinct

definition of the competency-based approach than was provided above (see Appendix B, p. 145).

Overview of the Study

A discussion of the limitations of existing models of change is presented in Chapter II, followed by a presentation of the Woelfel-Haller formulation. Chapter III contains a description of the operationalization of an original study. The findings are reported in Chapter IV. The summary and conclusion as well as a discussion of the findings are discussed in Chapter V.

CHAPTER II

REVIEW OF CHANGE MODELS

Introduction

As was noted in Chapter I, the process of change in higher education is of continuing interest. In attempting to understand the forces at work in this process, Part I of this chapter turns to a review of the general change literature. The purpose of this review is twofold. First, it identifies classes of independent variables the literature proposes to have a determining effect on the change process. It is hoped that such an analysis will point to the major forces that a general model of the change process must incorporate. A second purpose of the literature review is to present a discussion of the limitations of existing models of change. This discussion provides a rationale for employing a new theoretical formulation for the study of change. Part II of the chapter presents the Woelfel-Haller model of attitude and behavior formation.

PART I: REVIEW OF EXISTING CHANGE MODELS

The social psychological process of change has been analyzed from essentially two perspectives. First, there is what Havelock (1969) called the emerging "science of knowledge

utilization." The central focus of this approach is an attempt to understand "the processes of innovation, dissemination, and knowledge utilization." Its starting point for considering the process of change is the transfer of new information from a "resource system" (i.e., the originator of innovations) to the "user system" (i.e., the receiver of information from the resource system). This perspective generally attempts to identify factors that have a determining effect on the flow of information from the resource system to the user system.

Whereas the above perspective may generally be considered a sociological approach to the study of change, a second approach is much more psychological in nature. This second approach focuses its attention on the impact of information on an intervening variable in the change process, namely the attitudes of individuals. Since the process of change is viewed solely from the perspective of attitude change, this approach attempts to isolate external factors that affect the formation and change of attitudes.

The knowledge utilization approach is reviewed first, followed by a review of the pertinent literature in the area of attitude change.

Models of Knowledge Utilization

Havelock (1969) reviewed some four thousand studies dealing with "the process of innovation, dissemination, and

knowledge utilization." He found that these studies can be grouped into the following three general categories or "perspectives" corresponding to the principal models, methods, and orientations employed by the authors: (a) "research, development, and diffusion" (RD&D); (b) "social interaction"; and (c) "problem solving."

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

This model suggests that the process of change is an essentially orderly and rational process that moves from research through development and ends with a widely used product or process. Despite many variations of this change model appearing in the literature (Clark and Guba, 1965; Brickell, 1966; Heathers, 1966; Miles, 1964; Gallagher, 1964), the stages of this change model generally include research, development, diffusion, and adoption. Research is viewed as basic in nature, and hence is evaluated only in terms of its own validity. Its relationship to the process of change is that "it may provide a basis for innovation if anyone chooses to capitalize on the research and is clever enough to develop an application from it" (Clark and Guba, 1965, p. 7). The development phase is essentially applied research, and is typically divided into two sets of activities. The first of these centers around the invention of a new solution (i.e., an "innovation") to an operating problem. This invention is related to the concepts generated in the course of pure

research. The second set of activities involves the design and creation of a solution model for actual use. Diffusion or distribution of the new solution is viewed as an activity of the originator/developer oriented to a passive but rational audience. This third major phase is usually considered a communication endeavor. It involves creating a widespread awareness of the invention among practitioners, arousing interest in the new solution, demonstrating it, making equipment and materials available, and providing training and continuing support. Adoption of the solution model is not generally treated as a separate process. It is assumed that the target audience will accept the innovation if it is delivered through the right channel, in the right way, and at the right time.

The RD&D perspective is essentially descriptive rather than prescriptive. Although it succeeds in providing an overview of successful product creation and distribution, it does not satisfactorily explain the change processes in organizations and individual practitioners that deal with complex operating problems. And whereas the RD&D model places heavy emphasis on basic research and activities relating to the development of a usable product, it is inadequately oriented to the user. In the sense that it assumes a more or less linear flow from research to product development and utilization, this model can be said to be overrational. This idealized view of the change process

leads to only a token acknowledgment of the importance of program evaluation and consideration of the diverse factors that might relate to the diffusion and adoption process. As a consequence, the RD&D perspective proves to be somewhat barren as a source of potential variables for consideration in the diffusion-adoption process.

The belief in a rationalistic information dissemination process of diffusion leads the RD&D change model to advocate a rather simplistic change strategy. If the innovator wants to change a given practice, he should merely present his information to the decision maker; the decision maker, as a rational being, will respond positively to this information.

The Problem-Solving Perspective

The problem-solving model emerged as an alternative to the initial bureaucratic model formulated by Max Weber (1958). Weber's organization model is essentially a mechanistic one. It describes the ideal organization as a rationally designed social organization oriented toward accomplishing stated goals in the most efficient manner possible. The strength of the formal organization is its ability to focus knowledge and expertise on attaining its stated goals. Specialization in work activity, rules delineating areas of specialization, and use of hierarchical decision making are basic components of this model.

Based on observations that pointed to the importance of interpersonal relations and peer group pressure in the functioning of formal organizations (e.g., Roethlisberger and Dickson, 1964), the so-called human relations school offered an alternative model of organizational functioning. The literature of this school (Selznick, 1964; Whyte, 1964) indicates that in formal organizations informal work groups exist with their own normative structures, that interpersonal conflicts can affect intraorganizational communications and effectiveness, that the highest specialization is by no means the most efficient form of division of labor, and that policy decisions are often not imposed from above but agreed upon from below. Above all, the human relations school emphasizes the role of communication, participation, and leadership.

Authors from the human relations school view the change process as only part of a problem-solving process inside the user, which moves from a perceived need to a satisfaction of that need. The user system is not considered as necessarily functioning in a rational, efficient, and goal-directed manner. Rather, "irrational" factors are assigned a leading role in influencing the user in decisions about the course of action to be followed.

By focusing predominantly on the practitioner, this problem-solving model of the change process implies that

without the practitioner's needs and circumstances as prior facts, any solution model (i.e., innovation) is meaningless.

Proponents of the problem-solving perspective (Jacobs, 1964; Thelen, 1967; Lippitt, Watson, and Westley, 1958) typically draw upon the early work of Lewin (1952), and depict the change process as phases of unfreezing, moving, and freezing. In the unfreezing phase, problems creating stress in a system are translated into "problem awareness." Problem awareness, in turn, is transformed into a desire for change. Finally, problem awareness and the desire for change must lead to a specific desire for help from outside the system. This development of a need for change may occur in one of two ways: A change agent locates a source of difficulty and offers help, or the client system itself seeks help from an outside source. In the moving phase, the change agent helps the users to diagnose and clarify their problems, to examine alternative routes and goals, and to establish goals and intentions of action. The freezing phase is depicted as a process of institutionalization of the change. Freezing is posited to occur almost automatically once the innovation has gained a foothold.

By emphasizing the user's perspective the problem-solving model represents a psychological and "user-oriented" approach to the process of change. The logic of the model appears to be that by enhancing the user's awareness of his own needs, he will become more receptive to change.

Even though the problem-solving perspective may be said to put excessive strain on the user, it nevertheless emphasizes the importance of internal processes of the user, and the concept of a change agent who must actively intervene from the outside.

The Social Interaction Perspective

Unlike the two change models discussed above, the social interaction perspective is predominantly concerned with the process of change in nonorganizational contexts. The model is based largely on studies from rural sociology. Because of this orientation, it is explicitly concerned with the spread of agricultural and technical innovations. The model assumes that the receiver reacts to new information with the nature of this reaction determining whether or not he will move closer to adopting the innovation. Consequently, the critical variable in this model is the form of communication used in spreading the innovation.

Research generated by the social interaction perspective traces the flow of the innovation through a social system and assesses the effects of social structure and social relationships on its fate. Since studies have shown that the most effective means of spreading information about an innovation is through interpersonal channels, the key to adoption is posited to be the "social interaction" among members of the adopting group.

Authors writing from the social interaction perspective (Rogers and Shoemaker, 1971; Wilkening, 1962; Coleman, Katz, and Menzel, 1966; Lionberger, 1960) have generally described the diffusion of an innovation as a process consisting of five distinct phases: awareness, interest, evaluation, trial, and adoption.

At the initial stage of awareness, the individual is merely exposed to the innovation. This stage is seen as a relatively passive one on the part of the receiver: He is not yet motivated to seek further information. Awareness of an innovation is not posited to come about as a result of a need. Rather, awareness of a new idea creates a need for that innovation. During the interest phase, the individual actively seeks additional information about the innovation. At this stage, the individual has a generally favorable perception of the innovation, but he has not yet judged the innovation's utility in terms of his own situation. During the evaluation phase, the individual is posited to give the innovation a mental trial during which he mentally applies it to his present and anticipated future situation. On the basis of this mental evaluation, the potential adopter will decide whether or not to make a behavioral trial. When this decision is positive, he moves on to the trial stage. In this phase of the adoption process, the individual uses the innovation on a small scale to determine its utility in his own situation. Finally, in the adoption stage, the results

of the trial are considered, and a decision is made to adopt or reject the innovation. Sometimes an additional stage, integration, is added following adoption. It refers to the integration of the innovation into the individual's routine.

Theorists from the social interaction perspective suggest that the change agent must be attuned to his client's situation, problems, needs, and value system. He must also develop within the client a need for the innovation, influence its acceptance, and translate this acceptance into action. Reflecting the weight assigned to social interaction and communication, the social interactionist suggests that change agents need to be homophilous with their clients and concentrate their efforts on existing opinion leaders.

The social interaction perspective focuses on the relationship between forms of communication and the receiver's perception of and response to information coming from outside himself. The model pays little attention to the psychological processes within the individual adopter. This perspective rarely considers research and theory related to the user's internal needs. Yet, the model has generated considerable empirical research demonstrating the importance of such variables as personal relationships, group memberships and identification, social structure, opinion leadership structure, and above all, channels of communication.

Models of Attitude Change

The change literature in psychology is predominantly concerned with attitude change. Attitude is generally defined as "a disposition to react favorably or unfavorably to a class of objects" (Sarnoff, 1962, p. 165). By focusing on attitude change, psychologists have chosen to attend to an intervening variable whose study is inextricably bound up with the study of overt behavior change. Following is a review of the most prevalent models of attitude change.

Reinforcement Theory of Attitude Change

The Yale Communication Research Program, initiated and directed for many years by Carl Hovland, was the first program of continuous empirical study of attitude change. The attitude change model, as set forth by Hovland, Janis, and Kelley (1953), draws mainly upon learning theory. The essence of the model is that attitude change results from learning produced through reinforcement. The authors depicted the change process as consisting of three phases: attention, comprehension, and acceptance. Many of the reinforcement principles related to effective instruction are also assumed to relate to effective persuasion. Instruction, however, differs crucially from persuasion in that acceptance is generally taken for granted in the classroom setting, whereas in attitude change the occurrence of

persuasion depends on incentives. The authors suggested that persuasive communication may provide incentives by arousing expectations that are reinforcing. The model singles out three expectations (incentives) as being of major importance: first, the expectation of being right or wrong; second, the expectation of manipulative intent on the part of the communicator; and third, the expectation of social approval or disapproval.

The central criticism of any reinforcement theory of attitude change is that it does not explain what a reinforcing stimulus is. It is possible to show that certain expectations appear to act as reinforcers and to infer that they will act as reinforcers in other situations. But without a satisfactory explanation of what makes a stimulus reinforcing, it is necessary to catalog all the expectations that may conceivably influence acceptance or rejection of a persuasive communication. Furthermore, as Insko (1967) pointed out, despite the fact that the concepts of attention, comprehension, and acceptance are key elements in the model, both the theoretical statement and existing research evidence about the relationship among these elements are vague and inconclusive.

It must be remembered, however, that the formulation of Hovland and his associates was intended only as an initial framework for later theory building. As such, it has succeeded in providing a relevant model for research concerned

with the effects upon attitude change of fear-arousing communications (Janis and Feshback, 1953), source credibility (Hovland and Weiss, 1951), and primacy versus recency of communication (Hovland and Manell, 1957).

Consistency Theories of Attitude Change

The most recent formulations in contemporary social psychology concerning attitude change have been grouped together under the name of "consistency theories" (Zajonc, 1960). The theorists surveyed by Zajonc employed different terms, such as "balance," "dissonance," or "congruity," but nonetheless showed a parallel theoretical development. Consistency theories generally postulate that an individual's attitude constellation strives to maintain a state of equilibrium, or homeostasis. Accordingly, the belief system is seen as seeking a state wherein the related elements in the system are made up of noncontradictory items that exist in harmony with each other.

Heider (1946) is considered by some to be the father of modern consistency theory. His "balance theory" postulates a triadic cognitive system, the elements of which are: the person himself (P), another individual (O), and a social object (X). The relations among these three elements may be positive or negative. A state of balance is achieved when the three values are either all positive or when two are negative. Thus, if P likes O and dislikes X,

and O likes X the system is out of balance. In striving for a balanced state, one or the other must be changed. Either P must change his feelings about O, or alter his attitude toward X.

A similar model was proposed by Newcomb (1953, 1959) in his theory of symmetry. Newcomb's model consists of two people (A and B) and A's and B's orientation toward an object (X). Newcomb postulated a "strain toward symmetry," which leads to a common orientation of attitudes of A and B toward X. The pressures toward symmetry in the system lead A and B to influence each other so as to bring their attitudes toward X into congruence. Newcomb's significant contribution to consistency theory was to extend the theory by taking Heider's notion of balance among cognitive elements in the mind of one person and applying it to communication among people.

Osgood and Tannenbaum (1955) advanced a special case of balance--the principle of congruity--which deals specifically with the direction of attitude change. The authors proposed that attitudes tend toward maximum simplicity. Since extreme judgments are simpler than refined ones, attitudes tend to move toward maximum polarization. Coupled with the notion of maximization of simplicity is the assumption that related objects are evaluated in a similar manner. Given these assumptions, the principle of congruity postulates that when attitude change occurs, it occurs in the

direction of increased congruity with the prevailing frame of reference. The congruity model involves an individual confronted by an assertion regarding an object about which he has an attitude, made by a person toward whom he also has an attitude. Incongruity is assumed to exist when the attitudes toward the person and the object are similar and the assertion is that they are not similar, or when the attitudes are dissimilar and the assertion is that they are similar. When incongruity exists, there will be pressure to change the attitudes both toward the source and the object of the assertion in the direction of increased congruity. The degree to which each attitude will be modified by the other is posited to be inversely proportional to the original intensity of the attitude prior to becoming related.

Perhaps the most general of the consistency theories is Festinger's theory of cognitive dissonance (1957). Festinger postulated that an individual's opinions, attitudes, and beliefs tend to form clusters that are internally consistent. Inconsistency or "dissonance" occurs when, among the elements in a cluster, "the obverse of one element would follow from the other" (p. 13). The existence of dissonance is thought to give rise to pressures to reduce dissonance and to avoid increases in dissonance. Dissonance reduction can be brought about in any of three ways: changing a behavioral cognitive element, changing an environmental cognitive element, and/or adding new cognitive

elements. Changing a behavioral cognitive element is illustrated by the driver who trades his Cadillac for a Volkswagen when he learns of the energy crisis. Changing an environmental cognitive element is illustrated by the driver who distorts the reasons why he is driving a Cadillac upon being reminded of the energy crisis. Adding new cognitive elements is illustrated by the Cadillac driver who seeks out new material critical of the assertions that there is an energy shortage.

Zajonc (1960) and Insko (1967) reviewed the research generated by the consistency models. Most of this research was conducted under artificial laboratory conditions. The reviewers concluded that despite mixed findings, research has generally produced results that are successful in accounting for a wide range of attitudinal phenomena and are able to give an encouraging degree of support to the notion of consistency. However, these same experiments have been criticized on the grounds that alternative theoretical interpretations can also account for the results (e.g., Chapanis and Chapanis, 1964).

A major criticism of consistency theories has been that they are not able to completely account for the phenomena they examine. All consistency models stipulate that they can completely account for attitude and behavior changes only when other factors are held constant. However, the models do not shed light on just what factors must be held

constant, or how important these factors are. Also, except perhaps for Osgood and Tannenbaum's formulation, no predictions are made about which of the many possible ways of reducing imbalance or dissonance will be taken in any given situation. For example, Newcomb listed seven potential actions resulting from imbalance. An additional weakness of consistency models is the vagueness with which "imbalance," "incongruity," or "dissonance" is defined. Without a comprehensive definition of the hypothesized cause of behavior, a convincing validation of consistency models is not feasible.

For the time being, however, the consistency principle continues to be a valuable explanatory concept in attitude change research. It partially succeeds in systematically accounting for a variety of attitudinal phenomena, many of which cannot be explained by competing formulations. The fact that there are numerous exceptions to consistency and balance does not disprove the validity of the consistency principle. But it does indicate the need for more precise definition of the essential concepts and parameters of the consistency models, and it invites alternative theoretical considerations.

Other Models of Attitude Change

Another group of attitude change models assumes that in order to change attitudes it is first necessary to know

what attitude one is trying to change (cf. Insko, 1967, pp. 330-344). Consequently, these theories focus on the classification of attitudes and on the conditions under which each type changes. Kelman's theory of the "three processes of social influence" (Kelman, 1961) is the most widely known of these theories. Kelman assumed that attitudes "adopted under different conditions of social influence, and based on different motivations, will differ in terms of their qualitative characteristics and their subsequent histories" (p. 60). Kelman distinguished among three processes of social influence, each leading to a different type of attitude: compliance, identification, and internalization. Compliance occurs "when an individual accepts influence from another person or from a group because he hopes to achieve a favorable reaction from the other." Identification occurs "when an individual adopts behavior derived from another person or a group because this behavior is associated with a satisfying self-defining relationship to this person or group." Finally, internalization occurs "when an individual accepts influence because the individual behavior is congruent with his value system."

Kelman suggested that the conditions under which attitudes change will depend upon the influence process that preceded them:

> (a) A response adopted through compliance will be abandoned if it is no longer perceived as the best path toward the attainment of social rewards.

> (b) A response adopted through identification will be abandoned if it is no longer perceived as the best path toward the maintenance or establishment of satisfying self-defining relationship. (c) A response adopted through internalization will be abandoned if it is no longer perceived as the best path toward the maximization of the individual's values (Kelman, p. 70).

Kelman's model is still largely untested. One difficulty with such models lies in deciding just how attitudes should be classified. However, the assumptions of the model sound plausible, and further empirical investigations using such a perspective could prove worthwhile.

The last model of attitude change to be reviewed can best be classified under the rubric of reference group theory. Studies by Sherif and Sherif (1953), Merton and Rossi (1956, pp. 225-256), and Siegel and Siegel (1957) lend support to the notion that an individual's membership groups and reference groups (i.e., groups in which the individual aspires to maintain membership or aspires to attain membership) have an important influence on his values and attitudes. Although this reference group model of the attitude change process has not been incorporated in a formal theory, it prompts consideration of yet another potentially important set of variables in relation to attitude. However, it remains unknown just how important reference group variables are and how they influence the individual's attitudes and actions.

Summary

Part I of this chapter has reviewed several perspectives of the change process for the purpose of identifying the general nature of a change process model. It should be noted that most of the conceptualizations have been divorced from a general theory of change. The result has been a number of models, each suggesting that change is the result of some finite set of social and/or psychological variables. Whereas each model can account for some of the varied phenomena of the change process, none has demonstrated any significant powers in explaining or predicting change.

The failure of social sciences to provide clear evidence of the social and psychological roots of the process of change may be traced to three areas of difficulty.

First, there has been no common conceptualization of the dependent variable being analyzed. For example, investigations from the RD&D perspective have focused on the activity of the developer as he designs and develops a potential solution, whereas studies conducted from the problem-solver perspective have concentrated on a general state of susceptibility to change. Investigators within the social interaction perspective have analyzed the receiver's perception of and response to information coming from outside himself. Finally, psychologists have focused their attention exclusively on the acquisition of new

attitudes, without regard to questions of the utility of the attitudinal object involved.

A second area of difficulty of investigations concerned with the change process is their concern with the effect of independent variables on "change," or "no change" (e.g., Carlson, 1965; Coleman et al., 1966; Price, Harburg, and Newcomb, 1966; Sarbaugh and Hawkins, 1973). Such a dichotomous nominal classification of behavioral outcomes requires a proportional mode of analysis, i.e., a breakdown of the proportions of persons who have changed the behavior under consideration. Accordingly, for any given individual in the sample, a hypothesized causal variable must be classified as either effective or not effective in bringing about change. Although it might appear sensible to assume that a variable's effect on the change process is related to its value, the dichotomous characterization of the dependent variable does not permit determination of the exact functional relationship between the causal variable and the change process.

The third major difficulty in the social psychological study of change lies in the fact that each theoretical approach has utilized an admittedly narrow range of variables. The RD&D perspective tends to ignore "irrational" social and psychological variables that might intervene in the process of change. The problem-solver perspective emphasizes the user's internal world while neglecting the

role of external variables. Conversely, the social interaction perspective may be accused of overlooking the psychological processes inside the focal individual. Finally, each model of the attitude change process focuses on a unique set of independent variables and thereby tends to neglect the variables suggested by alternative models. Although it seems evident that the variables affecting change are multiple and diverse, no investigation has provided a means by which the effects of several different forms of influence may be simultaneously examined.

In light of these difficulties, new theoretical initiatives seem warranted. However, if such new contributions are to clarify rather than confuse research, they must: (a) employ a widely interpretable, continuously scaled dependent variable applicable to the study of behavior changes among individuals; and (b) bring together diverse social, psychological, and structural variables.

As Woelfel and Hernandez (1972) pointed out, one solution to the first issue is to construe behaviors and attitudes as rates (e.g., number of a certain class of behavioral acts performed over some increment of time) or psuedo rates (e.g., degree of favorableness toward a certain class of behavioral acts). With such continuous scaling of the dependent variable, an individual's rate of performance may be construed as a vector, the magnitude of which may be assumed to be changed, however minutely, by

every change in any variable causally related to the dependent behavior. The extent to which the vector is changed by the independent variable can be taken as a measure of the effectiveness of the change in the dependent variable.

To resolve the issue of a joint examination of the diverse variables that previous research has shown to be related to the change process, we may employ a theoretical perspective first outlined by Woelfel and Haller (1971a). These authors suggested that a number of diverse sociological and psychological variables may be simultaneously examined in terms of the information they represent or control, and that such information is the sole agent in attitude formation and change. Since the Woelfel-Haller formulation assumes behavior to be controlled only by the individual's attitude toward that behavior (controlling for physical circumstances that might prevent the behavior), information is viewed as a "motor force" toward behavior. The Woelfel-Haller formulation is presented in Part II of this chapter.

PART II: THE WOELFEL-HALLER MODEL

As the literature review in Part I of this chapter indicated, previous research on the processes that underlie changes in an individual's attitudes and behaviors toward a given object has been invaluable because it has clearly established the presence of some relationship between a

variety of structural, psychological, and sociological variables and an individual's attitudes and behaviors. All of these studies tend to confirm the general hypothesis that attitude and behavior change are the result of some finite set of factors. However, in doing so they raise important questions about the actual dynamics of the influence process. For example, what is the relative net effect of each variable? And since it is evident that several variables might exert their influence simultaneously, how are differences among the influences to be reconciled? In short, what is the net effect of the multiple and disparate influences that exert cross-pressures on the individual?

The theory to be used in the identification and measurement of the effects of various influences on the process of change in teaching attitudes and behaviors was drawn from the study of the educational and occupational aspiration formation process. It was first presented by Woelfel and Haller (1969, 1971a), and was elaborated in Woelfel (1971), Woelfel and Hernandez (1972), and Woelfel and Saltiel (1974). Data in support of this theory were presented in Chapter I. Part II of this chapter draws heavily on these sources in presenting the general theory.

Attitude Formation Theory

Concurring with those who consider attitudes to be cognitive phenomena (Green, 1954; DeFleur and Westie, 1963),

the Woelfel-Haller formulation assumes that attitudes are relationships between a person and an object or set of objects.* However, following from the symbolic interactionists' postulate that the perception of objects is always mediated by some symbolic structure (Kuhn, 1964), Woelfel and Haller assumed a conception is the object of an attitude. An individual does not have an attitude toward teaching, but rather toward his conception of teaching. Accordingly, an attitude is assumed to be "the relationship a person sees between his conception of himself and his conception of the objects in question" (Woelfel and Haller, 1971a, p. 75).

But some of the most perceptive of our current psychologists consider it self-evident that forming a conception of an object is a classification procedure:

> The first, and perhaps most self-evident point upon reflection, is that perceiving or registering on an object or an event in the environment involves an act of categorization. We "place" things in categories. That is a "man" and he is "honest" and he is now "walking" in a manner that is "leisurely" with the "intention" of "getting some relaxation." Each of the words in quotation marks involves a sorting or placement of stimulus input on the basis of certain cues that we learn how to use (Bruner, 1958, pp. 92-93).

Thus, one forms an attitude toward an object (including one's self) by placing it into a series of categories

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*By "object" is meant anything that can be designated or referred to, not merely physical objects like chairs and desks, but psychological objects as well, like beliefs and ideas.

with other objects thought to be in some sense the same. Insofar as these categories "filter" a person's perception of the objects within them, they are termed "filter categories" (Haller and Woelfel, 1969, p. 24).

Following from these premises, attitude is defined as "a person's conception of the relationship between the filter categories of which he sees himself to be a member and the filter categories of which he sees the object to be a member" (Woelfel and Haller, 1971, pp. 74-75).

The basic components of attitudes as outlined above are filter categories for the person's own self (e.g., "good person," "teacher," "music lover," and so forth), and filter categories for the objects of experience (e.g., the object "French cuisine" may be placed into such categories as "greasy," "tasty," or "fattening," etc.). It follows that a modification of any of these filter categories will result in a modification of the attitude. Woelfel and Haller went on to suggest that decisions about how to categorize objects are based entirely on perceived similarity and difference. "Classification is thus a cognitive act based on the information one has about objects and self" (Woelfel and Haller, 1971, p. 76). Since information is posited to constitute the basis of filter categories, attitudes are depicted as purely informational structures consisting of the relationship an individual conceives to exist between himself and some object or set of objects of his experience. It follows,

then, that the processes by which attitudes are formed and changed are those by which information about the individual's relationship to objects is transmitted to him. The theory distinguishes two such processes: transmission of information by other persons and the individual's own observation of his behavior with regard to the object (self-reflexive activity).

Transmission of Information by Others

Following Kelly (1952), the theory distinguishes between influence exerted by those who verbally communicate with a person (definers) and those who serve as models for a person's attitudes (models).

Definers.--The former influencers, namely those who communicate information through the mediation of some symbol system, are called definers. They may exert their influence on the filter categories by which the individual defines objects of his experience, the filter categories the individual uses to define himself, or on both. Influence from a definer may be either direct or filtered. When the influence is direct, the definer directly places an object into an existing filter category (e.g., "the systems approach is a rational approach to educational problem solving"). The influence is filtered when the definer modifies an individual's definition of a filter category into which the individual has already assigned the object. For example, if

the individual already believes the systems approach is a rational approach to educational problem solving, the definer may affect the individual's attitude toward the systems approach by redefining his orientation to rational approaches to educational problem solving (e.g., "you ought to use a rational approach to instruction"). Thus, if the influence is filtered, the definer can affect an attitude toward an object without directly referring to that object.

Models.--Those who serve as models for an individual's attitudes may exert their influence by serving as (1) models for objects (e.g., a model may form or modify an individual's conception of an "instructor using the systems approach" simply by being such an instructor where that individual can observe him); (2) models for self (inasmuch as the individual considers the model to be in the same category and thus his conception of himself); or (3) both.

In summarizing the techniques by which "others" affect an individual's attitudes, we find that the theory provides for four types of influence: definers for objects, definers for self, models for objects, and models for self. By specifying the modes by which information is transmitted to the individual, the theory provides a basis for identifying relevant sources of influence.

Self-Reflexive Activity

Mead (1934) defined self-reflexive activity as behavior in which an individual confronts himself in responding to some object and makes an inference about himself as an active self on the basis of that confrontation. Woelfel and Haller viewed self-reflexive activity in a much looser sense than Mead's original intention. They referred to it as "any definition a person makes about his relationship to an object on the basis of his own observations" (Woelfel and Haller, 1971a, p. 76). The theory does not specify the relative importance of information transmitted by others and self-reflexive activity. However, Woelfel and Haller hypothesized that an individual's unassisted observation of aspects of his experiential world is more influential when the object is unambiguous and clearly observable. When the object of the attitude is ambiguous or nonobservable, the influence of self-reflexive activity is believed to be decreased.

Other Related Attitudes

The theory suggests that in the abstract, information transmitted by other persons and self-reflexive activity are the only processes by which information about the individual's relationship to an object is transmitted to him. In the case of ongoing personalities, however, the information from these two sources is posited to be mediated by

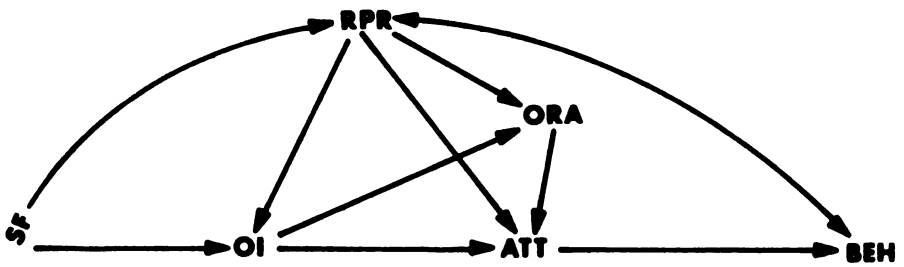
previously formed attitudes toward the object and related objects. More specifically, new information reaching the individual is thought to be evaluated in terms of its agreement with information that the individual has received in the past. Thus, the person who is being urged to use a particular instructional approach is very likely influenced by his instructional philosophy. He would hardly be expected actually to adopt this approach if he believed such an approach would be harmful to his students.

Structural Factors

Although essentially an information theory, an underlying assumption is that an individual's location in the larger social structure exerts a causal influence over the kinds of information to which the individual will be exposed. Social structural factors not only determine whom the individual will come in contact with, but will also influence the nature of information transmitted by others. In addition, structural factors are thought to exert influence over the kinds of unassisted observations (self-reflexive activity) the individual will be able to make. As with other theoretical variables, relevant structural factors will vary from attitude to attitude. Structural variables found to be related to specific attitudes include: SES to educational and occupational aspirations (Woelfel and Haller, 1971a); sex, age, and athletic sports activities

to attitude toward cigarette smoking (Mettlin, 1973); and sex, age, family SES, and region of country raised in to attitude toward marijuana smoking (Woelfel and Hernandez, 1972).

The general theory of attitude formation and behavior presented by Woelfel and Haller is represented in Figure 1.



SF = Structural Factors
RPR = Relevant Phenomenal Reality
OI = Others' Influence
ATT = Attitude
ORA = Other Related Attitudes
BEH = Behavior

Figure 1.--Schematic representation of a theory of attitude formation. Arrows show direction of influence (Woelfel and Haller, 1971b).

Information Processing

Whereas the general formulation of the theory is substantially similar in form to conventional interactionist theory, the methods by which the information from the various

theoretical sources mentioned above is thought to be processed by the individual present a radical departure from prior formulations. These methods are presented in Woelfel and Hernandez (1972) and Woelfel and Saltiel (1974).

Fundamentally, the theory assumes that no information, from whatever source, is ever totally discounted and that the resulting attitude is a simple linear aggregate of all information the individual has received about the attitude. Assuming that both the attitude Y and the incoming information are expressed on approximate ratio scales, the theoretical formulation states that the attitude of an individual equals the arithmetic mean of all attitudes proposed to that individual from all sources, or:

$$(1) \qquad Y_o = \frac{\sum_{i=1}^{n} X_1}{N}$$

Where Y_o = The attitude after the receipt of all messages

X_1 = The sum of the positions advocated to the individual

N = The number of messages the individual has received from all sources

On the basis of equation (1) it is possible to derive the expression for the value of the new attitude Y_1 upon receipt of new information by the individual as:

$$(2) \qquad Y_1 = \frac{\bar{X}_o N_o + \bar{X}_1 N_1 + \ldots + \bar{X}_n N_n}{N_o + N_1 + \ldots + N_n}$$

Where Y_1 = The new attitude

$\bar{X}_o$ = The old attitude

$\bar{X}_1 \ldots \bar{X}_n$ = The mean proposed location of the attitude from sources $\bar{X}_1 \ldots X_n$

$N_o, N_1 \ldots N_n$ = The number of messages out of which $\bar{X}_o, \bar{X}_1, \ldots \bar{X}_n$ are composed

The model presented thus far is the simplest linear theory that can be posited to explain the joint effects of a set of messages $\bar{X}_1, \bar{X}_2, \ldots \bar{X}_n$ on attitude Y. It assumes that all messages are equally effective and that no other variables have substantial effects. Each message $\bar{X}_1$ is construed as a "force" that pulls the attitude toward it. The resulting attitude is at that point at which all such forces "balance."

Why should the originators of this theory propose a model of attitude change whose causal factors (i.e., the number of new messages, number of messages out of which the original attitude is composed, and the mean position advocated by the new messages) are all thought to be linearly related to attitude change? Woelfel and Saltiel (1974) offered three reasons for proposing a linear model for resolving the question of the effects of communication on the formation and change of attitudes. First, the linear model implies a theoretical model that is parsimonious in its basic form, yet can be expanded easily to encompass complex empirical phenomena. Second, as Bochner and Insko

pointed out, no curvilinear models have shown impressively better empirical results than linear models. And third, linear models have frequently proved to be very successful empirically, particularly in real-life settings (e.g., Woelfel and Haller, 1971; Mettlin, 1973, 1973; Reeves, 1974).

The model as presented above assumes that messages $\bar{X}_1$, $\bar{X}_2$, . . . $\bar{X}_n$ are equally effective in relation to the attitude Y_1. Since it is probably not the case that all sources of information are treated equally by the receiver, equation (2) can be slightly modified to account for this fact:

$$(3) \quad Y_1 = \frac{\bar{X}_o m_o N_o + \bar{X}_1 m_1 N_1 + \ldots + \bar{X}_n m_n N_n}{m_o N_o + m_1 N_1 + \ldots + m_n N_n}$$

Where Y_1 = The new attitude

$\bar{X}_o$ = The old attitude

$\bar{X}_1 \ldots \bar{X}_n$ = The mean proposed location of attitude from sources $\bar{X}_1 \ldots \bar{X}_n$

N_o, $N_1 \ldots N_n$ = The number of messages out of which $\bar{X}_1$, $\bar{X}_1, \ldots \bar{X}_n$ are composed

m_o, $m_1 \ldots m_n$ = Weighing factors describing the relative effectiveness of a message from each source $\bar{x}_o$, $\bar{X}_1, \ldots \bar{X}_n$

In expression (3) the competing information sources $\bar{X}_o$, $\bar{X}_1$, . . . $\bar{X}_n$ have been assigned the constants m_o, m_1, . . . m_n to represent the relative effectiveness of messages from each of the sources.

Expression (3) can be restated as follows:

$$(4)\quad Y_1 = \bar{X}_o \frac{m_o N_o}{m_o N_o + \ldots + m_n N_n} + X_1 \frac{m_1 N_1}{m_o N_o + \ldots + m_n N_n} + \ldots$$

$$+ X_n \frac{m_n N_n}{m_o N_o + \ldots + m_n N_n}$$

This expression shows that the effect of any message projected along the vector (Y) of the dependent variable is equal to the product of the value of that message and the ratio of its "inertial mass" or "potency" to the total inertial mass of all the messages received.

In expression (4) the theoretical net effectiveness of any information source (e.g., $\bar{X}_1$) is represented by:

$$\frac{m_1 N_1}{m_o N_o + \ldots + m_n N_n}$$

This is the formal equivalent to the partial slope of $\bar{X}_1$ on the attitude Y_1, which is readily made clear when it is remembered that in the multiple regression equation $Y_1 = b_{x_o y}\bar{X}_o + b_{x_1 y}\bar{X}_1 + \ldots + b_{x_n y}\bar{X}_n$, the following expressions are equivalent:

$$b_{x_o y} = \frac{m_o N_o}{m_o N_o + \ldots + m_n N_n}$$

$$b_{x_1 y} = \frac{m_1 N_1}{m_o N_o + \ldots + m_n N_n}$$

etc.

To assess the relative net effectiveness of any two messages, we may now take the ratio of respective partial slopes to obtain:

$$(5) \quad \frac{b_{x_1 y}}{b_{x_2 y}} = \frac{\dfrac{m_1 N_1}{m_o N_o + \ldots + m_n N_n}}{\dfrac{m_2 N_2}{m_o N_o + \ldots + m_n N_n}} = \frac{m_1 N_1}{m_2 N_2}$$

According to expression (5), if the number of messages from each source is known or held constant, the estimation of the masses (or "forcefulness") of unit messages from various sources can be accomplished without difficulty. By using this formulation, two recent studies (Woelfel and Hernandez, 1972; Woelfel, Woelfel, Gillham, and McPhail, 1974) found that, compared to interpersonal sources, messages sent via mass media have virtually no effect on attitudes. Such an outcome is unanticipated by the theory, unless one is willing to make the unlikely assumption that the masses of media messages are very small.

To resolve this dilemma, Woelfel and Hernandez (1972) proposed that the implicit assumption of the unidimensionally scaled studies--that all forces are expressed

entirely along the vector of the dependent variable--is questionable. They speculated instead that the force of a message is exerted at an angle α to the dependent attitude vector, which they interpreted as the "relevance" of the message (see Appendix A). Taking advantage of the fact that the angle α (or "relevance") between the message vector and the vector of the dependent attitude is given by the arc cosine of the correlation, Woelfel and Hernandez estimated the inertial masses of messages from a variety of media. These estimates showed that, in their study, the masses of messages sent through media are roughly equivalent to messages sent through interpersonal channels, but that the relevancies of the media messages are significantly lower. Woelfel and Hernandez pointed out that these results are not expected to hold for any dependent variable, but rather are specific to the dependent attitude of their study (i.e., attitude toward marijuana use).

Summary

As Woelfel and Haller (1971a) summarized:

> Essentially, the theory presented here is an information theory, with attitudes defined as an individual's conception of relations to objects. Structural factors influence the kinds of significant others to which ego is exposed and the kinds of information that those significant others communicate to ego, and that information, along with what ego can observe from his own activities, provides the basic corpus out of which he sets his attitudes. That information is evaluated in terms of its consistency with previously accumulated information (i.e., other related attitudes) and results in the new attitude. Thus, the theory delimits five

> critical variables: (1) the dependent attitude; (2) the information by significant others; (3) those elements of phenomenal reality relevant to the dependent attitude which ego directly observes as self-reflexive activity; (4) the prior attitudes of the individual; (5) the individual's position in the social structure (p. 77).

As the theory stands now, it makes no assumptions about any affective ties that may or may not exist between the sources of information and the receiver. It also assumes that individuals do not react selectively to divergent information. Rather, an individual is posited to form an attitude that is a simple linear function of relevant information to which he has been exposed. Specifically, the model assumes that the attitude converges on the mean of all views received. This perspective of the attitude and behavior change process implies that the relative effects of sources of information can be estimated by linear regression techniques.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

The social psychological theory of attitude and behavior formation, as presented in Part II of Chapter II, has been developed in the course of analyzing the educational and occupational aspiration process, and it has been successfully applied in other areas of investigation. If the theory is to be considered as general, it must be able to account for other attitudinal and behavioral phenomena as well. This chapter presents the design of an empirical study that has as its basic purpose the application of the Woelfel-Haller formulation to the study of variations in teaching methods used in higher education.

Operationalization of Variables

The theory underlying this study is a general theory of attitude formation and change. As such, it delineates on a conceptual level the critical variables that must be taken into account in the attitude formation and change process. The operationalization of these variables varies in accordance with the nature of the attitude under consideration. Accordingly, specific instances of the general

variables with regard to a given attitude under study must be determined empirically. The development of operational measures for this study encompassed two distinct phases.

The initial phase involved a search of the relevant educational and education-related literature for a list of measures that constitute operationalizations of the critical variables suggested by the theory and that have been demonstrated to be related to the attitude and behavior under study. The operationalization of the dependent variable (i.e., use of the competency-based approach to instruction) was based primarily on the writings of Banathy (1968), Kaufman (1968), Gerlach and Ely (1970), and Popham and Baker (1970). The independent variables (i.e., other related attitudes, others' influence, relevant phenomenal reality, and structural factors) drew heavily on the literature reviewed or contained in Havelock (1969), Rogers and Shoemaker (1971), and the descriptors Innovation, Change Agents, Diffusion, and Information Dissemination in ERIC (Educational Resources Information Center) documents. Additional measures for the critical variables were selected on the basis of suggestions by faculty members and graduate students in the areas of higher education and communication. With the help of these resources, a pool of approximately sixty-five variables was generated. These variables, along with their constituent items, were carefully reviewed and modified by several members of the faculty in education

and communication, with sixty variables selected for pretesting.

During the second phase of instrument development a preliminary draft of the instrument was administered to fifteen faculty members associated with various colleges at Michigan State University, with instructions to circle words and phrases they did not understand. Analysis of these results, along with general comments from these faculty members, resulted in a final instrument measuring a total of fifty variables.

An account of the various measures used to operationalize each of the six critical variables suggested by the Woelfel-Haller formulation follows.

1. The Behavioral Dependent Variable (BEH)--Use of the competency-based teaching approach (Variable X_{01}).

The domain of the dependent variable was described in Chapter I (pp. 7-12). Although the educational engineering "science" is still in its infancy, there is general agreement among theorists regarding the interrelated activities in which an educational practitioner ought to engage if his teaching behavior is to be considered competency based. The instrument developed for measuring competency-based behavior consists of a set of eight items that, according to educational engineering theorists, constitute the basic behavioral component of the competency-based approach to instruction. The items reflect the main phases of educational

systems development: specification of learning outcomes in behavioral terms, analysis of instructional system, design and development of system, and evaluation/revision. Each of the eight items was measured on a seven-point Likert-type scale (see Appendix B, pp. 135-137). The sum of these items was taken as the degree to which a respondent actually used the competency-based approach to his instruction. Thus, the dependent behavioral variable was measured on a continuously scaled variable ranging from zero to forty-eight.

2. The Dependent Attitude (ATT)--Attitude toward competency-based teaching (Variable X_{02}).

The dependent variable is, of course, competency-based teaching behavior. According to the theory guiding this investigation, there exists on the part of the individual instructor a belief having the form of a projected degree of competency-based behavior. That is, he maintains a conception of a degree of competency-based behavior appropriate to himself. He believes, for example, that he is the kind of instructor, like it or not, who uses the competency-based approach "all the way," or "to a limited extent only." According to the theory to be applied in this study, it is this attitude that exerts a causal influence on the behavior. It was judged that, from the theoretical point of view, an item-wording of the following type would prove most satisfactory: "To what extent do you

consider yourself a user of the competency-based approach to instruction?" This measure of the dependent attitude is continuously scaled, ranging from "not at all" (zero) to "to a very high extent" (ten).

3. Others' Influence--An independent variable (OI).

When referring to influence transmitted to ego from outside, the Woelfel-Haller formulation speaks of so-called "significant others." Significant others are defined as "those persons who exercise major influence over the attitudes of individuals" (Woelfel and Haller, 1971a, p. 75). However, Woelfel and Hernandez (1972) pointed out that within the theory, mediated influence is construed as an extension of the process of interpersonal influence. Since it seems evident that teaching behavior is influenced by sources other than interpersonal ones, such sources will be included among "others' influence."

Definer-Type Influence--Operationalization of this variable measuring the influence of definers occurred in two ways: definer-type influence transmitted specifically about competency-based teaching behavior, and influence transmitted about related objects.

a. Definer-Type Influence Specifically About Competency Based Approach, Variables X_{03} through X_{12}.

To measure this variable, ten information sources were identified. Even though these sources are not exhaustive, they were deemed to provide the main share of direct

influence regarding teaching matters for faculty members in higher education. To measure the amount of relevant information transmitted by each of these sources, a three-item index was constructed. The first item measures exposure to the information source ("How many hours per week do you spend with . . .?"). A second item measures coverage of teaching-related matters ("What percentage of information from . . . deals with matters related to teaching methods?"). The third item assesses the bias of the coverage ("To what extent is this coverage in favor of or opposed to the competency-based approach?"). This last item is scored from -3 ("highly opposed") to +3 ("highly in favor"). Accordingly, the product of these three items results in an index varying from about -600 (intensive negative influence) to about +600 (intensive positive influence). Zero influence results if (a) there is no reported contact with a source of information, (b) there is no transmission of teaching-related information, or (c) coverage is neutral, i.e., neither favorable nor unfavorable.

b. Definer-Type Influence About Related Objects, Variables X_{13} through X_{17}.

Influence transmitted by others that is not specifically about the use of the competency-based approach but is related to it is measured by five variables. The respondent is asked to estimate the position of his friends on seven-point continua relating to: (X_{13}) preference for

teaching, (X_{14}) innovativeness, (X_{15}) the belief that different teaching methods will result in different learning outcomes, (X_{16}) the belief that students will benefit from the competency-based approach, and (X_{17}) the belief that the competency-based approach justifies the resources it requires.

Model-Type Influence--Influence transmitted to the individual by means of what others do is measured by three separate indexes (X_{18}, X_{19}, X_{20}). The first of these measures competency-based behavior among friends. The second assesses such behavior in the respondent's department. The third index refers to competency-based behavior observed during one's own college education. Each index is arrived at by multiplying the amount of competency-based behavior by the degree to which it reflects the ideal competency-based approach.

4. Self-Reflexive Activity--An independent variable (Relevant Phenomenal Reality = RPR), Variables X_{21} through X_{25}).

The specific aspects of one's phenomenal reality that ego takes into account when setting his attitudes with respect to teaching methods are difficult to isolate. However, in higher education settings, it may be presumed that these vary by contextual effects of a variety of factors that identify an individual in the larger social structure. For example, the number of teaching-related

activities in which an instructor engages may be influential in determining the kind and number of relevant aspects he can observe unassisted. Thus, self-reflexive activity is not measured per se. Rather, it is operationalized by means of the following structural variables: (X_{21}) number of courses taught, (X_{22}) number of underclass courses taught as a percentage of courses taught at all levels, (X_{23}) number of teaching-related activities engaged in, (X_{24}) social connectedness as measured by number of people respondents indicate they would like to work with (cf. Biglan, 1973), and (X_{25}) respondent's status as an instructor within his department.

5. Other Related Attitudes--An independent variable (ORA), Variables X_{26} through X_{39}.

The theory underlying this study assumes that the influence of attitudes toward objects related to the attitude under study will exercise independent influence on the dependent attitude. Judgments about what other related attitudes to include in this research were made primarily on the basis of (a) a review of the relevant educational literature (cf. especially Havelock, 1969; Rogers and Shoemaker, 1971; and the descriptors Innovation, Change Agents, Diffusion, and Information Dissemination in ERIC [Educational Resources Information Center] documents); and (b) interviews with faculty members and graduate students in the area of higher education. The following

attitudes were judged to be related to the dependent attitude under study and were measured on seven-point Likert-type scales: (X_{26}) preference for teaching--as opposed to research, administration, and service; (X_{27}) preference for highly structured activities in the instructional setting; (X_{28}) task orientation (as opposed to process orientation) in the instructional setting; (X_{29}) favorableness toward instructional innovations; (X_{30}) "openness" of respondent (openness as defined here refers to an active eagerness to seek out new ideas, a willingness to receive new ideas, and a desire to pass on new ideas to others [cf. Havelock, 1971, p. 18]); (X_{31}) orientation toward behaviorism as an educational philosophy; (X_{32}) belief that the competency-based approach is harmful to students; (X_{33}) belief that the competency-based approach is "superior" to a non-conpetency-based approach; (X_{34}) belief that the competency-based approach is inappropriate for own teaching; (X_{35}) belief that the competency-based approach justifies the resources needed for its initiation and maintenance; (X_{36}) belief that the competency-based approach is not compatible with one's ideals of teaching; (X_{37}) perceived lack of needed resources to implement fully a competency-based approach; (X_{38}) belief that different teaching methods will result in different learning outcomes; and (X_{39}) perceived need for change in higher education.

6. Structural Factors--An independent variable (SF), Variables X_{40} through X_{50}.

The theory suggests that relevant variables that identify an individual's location in the larger social structure are causally related to the kinds of information sources to which he will be exposed. The theory also assumes that the individual's location in the social structure is taken into account when others set their expectations for him. In this research, structural factors are partially synonymous with RPR variables. But, in addition to the variables listed under "Self-Reflexive Activity," this research includes the following structural variables: (X_{40}) characteristics of subject matter taught. (This variable divides the fields of teaching into pure and applied sciences. [The assignment of fields into pure and applied areas was done on the basis of a model developed by Biglan, 1973.] Thus, this variable is measured on a dichotomous scale on which the pure sciences are scaled as 1 and the applied sciences as 0.) (X_{41}) Membership in college of education vs. membership in other colleges. (Since there is reason to believe that faculty members in the college of education are relatively more exposed than are others to information related to teaching methods and may be considered experts in teaching matters, this variable assumes a value of 1 if the respondent is a member of the college of education and a value of 0 if he belongs to another college.)

(X_{42}) Average size of classes taught by respondent, (X_{43}) years a faculty member at present institution, (X_{44}) sex, (X_{45}) number of courses attended as a student in the field of education, (X_{46}) degree of one's decision-making autonomy in teaching-related matters, (X_{47}) degree to which the decision-making process in one's department may be described as autocratic, (X_{48}) innovativeness of department, (X_{49}) innovativeness of department chairman, and (X_{50}) "openness" of department.

Table 1 presents all of the operational variables as discussed above, with each classified in terms of the theoretical dimension it represents, the specific items by which it is measured, and the abbreviation by which it will be referred to in subsequent discussions.

Table 1.--Identification and measures of operational variables.

	Operational Variable	Abbreviation	Measure*
X_{01}	Dependent behavioral variable: Focal individual's use of the competency-based approach to instruction	BEHAVIOR	Sum of items #40-47
X_{02}	Dependent attitudinal variable: Focal individual's self-conception as a user of the competency-based approach to instruction	ATTITUDE	Item #60
	Criterion-specific influence from definers:		Products of:
X_{03}	Colleague friends	FRIENDS	Items #67,77,87

Table 1.--Continued.

	Operational Variable	Abbreviation	Measure*
X_{04}	Fellow faculty members	FACULTY	Items #68,78,88
X_{05}	Administrators	ADMINISTRATORS	Items #69,79,89
X_{06}	Educational consultants	CONSULTANTS	Items #70,80,90
X_{07}	Teaching assistants, graduate assistants, administrative staff	STAFF	Items #71,81,91
X_{08}	Students	STUDENTS	Items #72,83,92
X_{09}	Departmental faculty meetings	FACULTY MEETS	Items #73,83,93
X_{10}	Other brief meetings (e.g., professional organization meetings, institutes, symposia, workshops)	BRIEF MEETS	Items #74,84,94
X_{11}	Extended meetings (e.g., college level courses, seminars)	EXTENDED MEETS	Items #75,85,95
X_{12}	Professional readings (e.g., books, journals, papers)	READINGS	Items #76,86,96
	Indirect influence from definers:		
X_{13}	Friends' preference for teaching	FRIENDS' TEACH PREF	Item #35
X_{14}	Friends' innovativeness in terms of instructional methods used	FRIENDS' INNOV	Item #36
X_{15}	Friends' belief that different teaching methods will result in different learning outcomes	FRIENDS' METHOD EFFECT	Item #37
X_{16}	Friends' belief that students will benefit from competency-based approach	FRIENDS' CBA BENEF	Item #58
X_{17}	Friends' belief that the competency-based approach justifies the resources it requires	FRIENDS' CBA RESOURCE	Item #59

Table 1.--Continued.

	Operational Variable	Abbreviation	Measure*
	Criterion-specific influence from models:		Products of:
X_{18}	Competency-based behavior among friends	FRIEND MODEL	Items #65,66
X_{19}	Competency-based behavior in one's own department	DEPT MODEL	Items #61,62
X_{20}	Competency-based behavior observed during one's own college education	OWN COLLEGE MODEL	Items #63,64
	Relevant phenomenal reality:		
X_{21}	Number of courses taught	NO OF COURSES	Item #1
X_{22}	Percentage of underclass (freshmen and sophomore) courses taught	UNDERCLASS COURSES	Item #2
X_{23}	Percentage of professional time spent on teaching-related activities	TEACHING ACTIVITY	Item #5
X_{24}	Social connectedness (as measured by number of people one would like to work with)	SOCIAL CONNECT	Item #13
X_{25}	Status as an instructor in one's department	STATUS	Item #21
	Other related attitudes:		
X_{26}	Preference for teaching--as opposed to research, administration, service	TEACHING PREF	Item #12
X_{27}	Preference for highly structured activities in the instructional setting	STRUCTURE PREF	Item #14
X_{28}	Task orientation--as opposed to process orientation in the instructional setting	TASK ORIENT	Item #15

Table 1.--Continued.

	Operational Variable	Abbreviation	Measure*
X_{29}	Favorableness toward instructional innovations	OWN INNOVATION	Items #22,23
X_{30}	Orientation toward receiving and passing on new ideas	OWN OPENNESS	Items #24,25
X_{31}	Orientation toward behaviorism as an instructional policy	BEHAVIORISM	Item #27
X_{32}	Belief that the competency-based approach is harmful to students	CBA HARMFULNESS	Item #49
X_{33}	Belief that the competency-based approach is "superior" to alternative instructional approaches	CBA SUPERIORITY	Item #50
X_{34}	Belief that the competency-based approach is inappropriate for own teaching	CBA INAPPROPRIATE	Item #51
X_{35}	Belief that the competency-based approach justifies the resources needed for its initiation and maintenance	CBA EFFICIENCY	Item #52
X_{36}	Belief that the competency-based approach is not compatible with one's ideals of teaching	CBA INCOMPATIBILITY	Item #53
X_{37}	Perceived lack of needed resources to implement fully a competency-based approach	RESOURCES	Item #55
X_{38}	Belief that different teaching methods will result in different learning outcomes	METHOD EFFECT	Item #19
X_{39}	Perceived need for change in higher education	CHANGE ORIENT	Sum of items 56 and reverse of 57

Table 1.--Continued.

	Operational Variable	Abbreviation	Measure*
	Structural factors:		
X_{40}	Characteristics of subject matter taught: pure vs. applied sciences	PURE VS. APPLIED SCIENCE	Item #3
X_{41}	Membership in college of education vs. membership in other colleges	EDUC MEMBER	Item #3
X_{42}	Average size of undergraduate classes taught	CLASS SIZE	Item #4
X_{43}	Years as faculty member at present institution	SENIORITY	Item #7
X_{44}	Sex	SEX	Item #8
X_{45}	Number of courses attended as a student in the field of education	EDUC COURSES	Item #11
X_{46}	Degree of one's decision-making autonomy in teaching-related matters	DECISION AUTONOMY	Item #20
X_{47}	Degree to which the decision-making process in one's department may be described as autocratic	AUTOCRACY IN DEPT	Item #30
X_{48}	Innovativeness of department in teaching-related matters	DEPT INNO-VATIVENESS	Item #31
X_{49}	Degree to which the department chairman is supportive of instructional innovations	CHAIRMAN INNOV	Item #32
X_{50}	Department's orientation toward receiving and passing on new ideas	DEPT OPENNESS	Sum of items #33, 34

*For item wording, see Appendix B.

Research Design

The most desirable procedures for testing the attitude and behavior change theory presented in Chapter II would involve a longitudinal study in which the value of new information provided the individual over a period of time could be accurately measured. However, because of funding restrictions and logistical problems, a truncated design was necessary. The research method utilized in the present study is known as a "hypothesis testing field study" (Katz, 1953). The approach is based on ex post facto inquiry aimed at discovering if the operational measures of (a) the dependent behavior, (b) the attitude under study, (c) the sources of information, (d) relevant phenomenal reality, and (e) structural factors are substantially related to each other as predicted by the theory.

The research procedure involved administering the instrument developed for this study (Appendix B) to faculty members in an institution of higher education. As pointed out above, this instrument was designed to scale subjects on all operational measures of the variables critical to the theoretical formulation.

The Sample

The population for the study was the teaching faculty in residence at Michigan State University. A member of the faculty (professor, associate professor, assistant professor,

or instructor) was considered "teaching" faculty provided he/she taught a minimum of one course during 1974. Copies of the instrument were sent to a simple random sample of 384 subjects. Nonrespondents were followed up at intervals of two weeks and four weeks (copies of the letter of introduction and follow-up mailings may be found in Appendices C, D, and E).

A total of 235 subjects (61 percent of the possible respondents) returned the questionnaire. Eighteen returns were dismissed as unusable--15 because of marked incompleteness, one because it arrived too late for inclusion in the data analysis, and two because virtually every response was in the undecided or neutral categories. This left 217 usable cases (57 percent) for inclusion in the data analysis. Tables 2 and 3 report basic demographic data regarding the sample.

Limitations of the Study

This study was limited by the usual deficiencies accompanying the use of self-report instruments. As with any newly constructed measure, concerns about the instrument itself, such as validity and reliability, were particularly pronounced.

Validity

Two arguments favor an assumption of face validity. First, the development of the measurement instrument went

Table 2.--Respondents vs. nonrespondents by primary field of teaching.

Field of Teaching	Respondents		Nonrespondents		Total Sample
	N	%	N	%	N
Agricultural Economics	6	85	1	15	7
Agricultural Engineering	3	100	0	--	3
Animal Husbandry	4	80	1	20	5
Anthropology	1	17	5	83	6
Biophysics	2	50	2	50	4
Business Administration	5	31	11	69	16
Chemistry	6	55	5	45	11
Communication	5	100	0	--	5
Economics	5	71	2	29	7
Education	24	77	7	23	31
Educational Administration	6	75	2	25	8
Engineering	9	82	2	18	11
English	12	57	9	43	21
Fine Arts	6	38	10	62	16
Food Science	3	50	3	50	6
Foreign Languages	5	71	2	29	7
Geography	3	50	3	50	6
History	5	62	3	38	8
Human Ecology	2	40	3	60	5
Human Medicine	9	45	11	55	20
Humanities	4	44	5	56	9
Mathematics	11	85	2	15	13
Microbiology	3	75	1	25	4
Natural Science	3	43	4	57	7
Nursing	3	50	3	50	6
Philosophy	4	44	5	56	9
Physical Education	4	80	1	20	5
Physics	5	42	7	58	12
Plant Science	7	50	7	50	14
Political Science	2	40	3	60	5
Psychology	8	57	6	43	14
Social Psychology	7	100	0	--	7
Social Science	4	57	3	43	7
Sociology	9	75	3	25	12
Statistics	1	25	3	75	4
Veterinary Medicine	4	67	2	33	6
Other fields	17	46	19	53	36
Fields not ascertained	___	___	(11)	___	(11)
Total	217	57%	167	43%	384

through a series of careful analyses and reviews (see description above). Second, efforts were made to inform subjects of the nature and purpose of the study and to reassure potential respondents of complete anonymity. Nevertheless, it must be kept in mind that faculty members tend to be suspicious of survey instruments because of the "structured questions about complicated issues, the forced choices among limited alternatives, [and] above all the sense that they are being studied rather than consulted, through methods that appear to them mechanical and stereotyped" (Trow, 1967, pp. 350-351).

Table 3.--Respondents' age by sex.

Age	Male	Female	Total	
			N	%
Under 25	1	0	1	1
25 - 29	9	4	13	6
30 - 34	32	11	43	20
35 - 39	35	6	41	19
40 - 44	26	4	30	14
45 - 49	23	2	25	11
50 - 54	22	4	26	12
55 - 59	12	8	20	9
60 or over	12	2	14	6
N.A.	2	2	4	2
Total	174	43	217	100

Reliability

Since most variables are measured by a very limited number of items only, reliability measures based on internal consistency are not feasible. One scale, X_{01} (the dependent behavior), however, does consist of a sufficient number of items (eight) to compute a coefficient of internal consistency. Using the Kuder-Richardson 21 formula, a reliability estimate of .87 was obtained. This reliability coefficient reflects very favorably on the reliability of the dependent behavior measure. However, reliability of the remaining measures is unknown and remains of concern.

Other Limitations

A further limitation of the study is inherent to its correlational design. The relationships among many of the independent variables must be assumed to be in reciprocal causal relationships with the dependent variables. Thus, the resulting regression equations cannot be taken as recursive models, and the multiple correlations must be interpreted with a great deal of caution.

Finally, whereas the 57 percent return rate obtained in this study compares favorably with similar studies working with the same population, unqualified inferences to the population under investigation are not warranted. As Table 2 indicates, respondents and nonrespondents were substantially similar in terms of their primary fields of

teaching. However, additional data about these two groups would be needed to substantiate a claim of no systematic differences between respondents and nonrespondents.

Data Analysis Procedures

Analysis of the data gathered in accordance with the study described above was based exclusively on multiple regression techniques. The primary methodological sources for the analysis procedures were Blalock (1972), Kerlinger and Pedhazur (1973), and Van de Geer (1971).

The data were analyzed by means of the Statistical Package for the Social Sciences (SPSS), Version 5.8, through the CDC computer installation at Michigan State University. In analyzing the data, the following basic procedures were utilized:

First, to obtain an estimate of the overall relationship between the independent variables and the criterion variables of this study, all independent variables were entered into a single regression equation as predictors of the dependent variable. The resulting coefficient of determination (R^2) was used as the criterion of interpretation.

Second, to compare observed relationships among sets of variables against the relationships predicted by the theory, the component variables of each theoretical factor were collapsed such that each one was represented by a single

measure. The observed relationships among these measures of the theoretical factors could then be compared to the predicted relationships.

Third, to determine the relative effects of each theoretical independent factor on teaching attitude formation, the single measures for each theoretical independent factor (see preceding paragraph) were entered into a multiple regression equation as predictors of the dependent attitude. The resulting standardized slopes (β) for each theoretical factor were then taken as estimates of their relative importance.

Throughout the data analysis, missing data were dealt with by pairwise deletion of cases with missing values. That is, a missing value for a particular variable causes that case to be eliminated from the calculations involving that variable.

CHAPTER IV

FINDINGS

Introduction

This chapter contains an analysis of the data collected in the study, described in Chapter III. The purpose of the data analysis is threefold. First, it is meant to provide evidence of whether or not the variables used in this research are indeed determining forces in the attitude and behavior formation process under consideration here. Second, the analysis is to assess the degree to which the data correspond to the attitude formation model as presented in Chapter II. Finally, the data analysis will estimate the relative effect of the various informational variables on attitude and behavior change. For convenience of presentation, this chapter displays the findings in this same sequence.

Relationship Between Independent and Dependent Variables

The zero-order correlations among all variables used in this research are presented in Appendix F. The present analysis is not directly concerned with these coefficients. Of more concern is the degree to which the independent variables are related to the attitude and behavior under study

here. The multiple regression analysis using the attitude as the dependent variable is considered first.

The regression of attitude toward the use of the competency-based approach to instruction on all the independent variables is presented in Table 4. Of primary interest is the size of the multiple correlation coefficient, which is very high ($R = .835$). The coefficient of determination (R^2) is .70. Adjusting this latter coefficient for shrinkage yields $R^2 = .62$, still very high. However, in interpreting these coefficients, it must be kept in mind that many of the independent variables used in this study are probably in reciprocal relationship with the dependent attitude. For example, if we are to assume that the focal individual's attitude toward the use of the competency-based approach to teaching is influenced, in part, by the teaching behavior of his colleague friends, we must assume that this process of influence works also in reverse. Because of this nonrecursive relationship among the variables, caution must be exercised in interpreting these coefficients. Nevertheless, the magnitude of the coefficient of determination is sufficient to indicate that the independent variables used in this research are of central importance in the attitude formation process under study here.

A most striking finding in Table 4 lies with the variables assessing mean verbalizations of others about

Table 4.--Forty-Seventh Order Partial Regression Coefficients Predicting Conception of Self as a User of the Competency-Based Approach to Instruction.

Variable Name		b^1	β^2	Zero-Order Correlation
Criterion-specific influence from definers:				
X_{03}	FRIENDS	-.00	-.03	.33
X_{04}	FACULTY	.00	.01	.09
X_{05}	ADMINISTRATORS	.00	.03	.29
X_{06}	CONSULTANTS	.00	.04	.27
X_{07}	STAFF	.00	.06	.26
X_{08}	STUDENTS	-.00	-.03	.46
X_{09}	FACULTY MEETS	-.00	-.02	.08
X_{10}	BRIEF MEETS	.32	.10	.28
X_{11}	EXTENDED MEETS	-.00	-.04	.12
X_{12}	READINGS	-.00	-.02	.35
Indirect influence from definers:				
X_{13}	FRIENDS' TEACH PREF	.16	.10	.17
X_{14}	FRIENDS' INNOV	-.15	-.07	.14
X_{15}	FRIENDS' METHOD EFFECT	.35	.15*	.25
X_{16}	FRIENDS' CBA BENEF	-.14	-.06	.33
X_{17}	FRIENDS' CBA RESOURCE	-.22	-.10	.38
Criterion-specific influence from models:				
X_{18}	FRIEND MODEL	-.13	-.13*	.34
X_{19}	DEPT MODEL	.33	.34*	.42
X_{20}	OWN COLLEGE MODEL	.23	.21*	.42
Relevant phenomenal reality:				
X_{21}	NO OF COURSES	.02	.03	.07
X_{22}	UNDERCLASS COURSES	.00	.03	-.07
X_{23}	TEACHING ACTIVITY	-.00	-.13*	.11
X_{24}	SOCIAL CONNECT	-.01	-.07	-.03
X_{25}	STATUS	.13	.07	.24
Other related attitudes:				
X_{26}	TEACHING PREF	.02	.15*	.11
X_{27}	STRUCTURE PREF	-.05	-.03	.27
X_{28}	TASK ORIENT	.37	.20*	.22

Table 4.--Continued.

	Variable Name	b^1	β^2	Zero-Order Correlation
X_{29}	OWN INNOVATION	.17	.14*	.22
X_{30}	OWN OPENNESS	-.10	-.06	.06
X_{31}	BEHAVIORISM	.21	.12	.35
X_{32}	CBA HARMFULNESS	.07	.04	-.38
X_{33}	CBA SUPERIORITY	.26	.15*	.56
X_{34}	CBA INAPPROPRIATE	-.24	-.17*	-.57
X_{35}	CBA EFFICIENCY	.27	.15*	.62
X_{36}	CBA INCOMPATIBILITY	-.10	-.06	-.53
X_{37}	RESOURCES	.17	.11	.50
X_{38}	METHOD EFFECT	.04	.02	-.06
X_{39}	CHANGE ORIENT	.05	.03	.25
	Structural factors:			
X_{40}	PURE/APPLIED SCIENCE	-.57	-.10	-.16
X_{41}	EDUC MEMBER	-1.31	-.16*	.06
X_{42}	CLASS SIZE	-.00	-.10	.00
X_{43}	SENIORITY	-.03	-.10	-.07
X_{44}	SEX	.42	.06	.09
X_{45}	EDUC COURSES	.13	.07	.15
X_{46}	DECISION AUTONOMY	.10	.06	.08
X_{47}	AUTOCRACY IN DEPT	.06	.04	-.06
X_{48}	DEPT INNOVATIVENESS	-.35	-.18*	.00
X_{49}	CHAIRMAN INNOV	.08	.04	.10
X_{50}	DEPT OPENNESS	-.14	-.12*	.04

$R = .83$ $R^2 = .70$ $N = 217$

Corrected for shrinkage[3] $\hat{R}^2 = .62$ Overall $F = 3.02$ ($p < .001$)

[1] b = unstandardized partial regression coefficient.

[2] β = standardized partial regression coefficient.

[3] cf. Kerlinger and Pedhazur (1973, p. 283).

*Denotes relatively high Beta coefficients (see text).

teaching methods (X_{03} through X_{12}). Despite moderately strong zero-order correlations between these variables and teaching method attitude, the unique effect of each variable seems to be extremely limited. Only variable X_{10} (brief meetings) shows a moderately strong relationship with the criterion variable. Of the remaining nine variables assessing direct influence from definers, five (X_{03}, X_{08}, X_{09}, X_{11}, X_{12}) even show a slightly negative Beta coefficient that is not predicted by the theory. However, considering the small magnitude of these negative coefficients and the fact that the standard errors associated with them are very large (from two to five times the magnitude of the Beta coefficients), it is likely that measurement error can account for the observed negative signs.

In Table 4, variables showing substantial Beta coefficients are highlighted by asterisks. As is evident, among the relatively more important variables are four "influence from others" variables, six "other related attitudes" variables, and three "structural" variables. The question of the degree to which these and the remaining relationships shown in Table 4 are in agreement with the relationships predicted by the theory is taken up in a later section of this chapter.

Aside from examining the effects of the theoretical variables on the self-conception, this study was also designed to ascertain the degree to which the variables

suggested by the Woelfel-Haller formulation are related to the behavioral correlate of the self-conception. Table 5 takes the actual use of the competency-based approach to instruction as the dependent variable and shows its regression on all the independent variables. The multiple correlation is .864, and R^2 = .75. Adjusting for shrinkage, the coefficient of determination still yields .68. Again, the nonrecursive nature of the relationship between the independent variables and the dependent behavior make it essential that these coefficients be interpreted conservatively. In addition, there is a question of some redundancy resulting from the relative similarity with which the behavioral variable (dependent variable) and the attitude toward that behavior (X_{02}, an independent variable) have been measured in this study. However, even if the self-conception measure is dropped from the regression, the multiple regression still yields .737.

As Table 5 shows, the self-conception measure (X_{02}) has a standardized slope of .82 associated with it. Among other variables with high beta coefficients are three "influence from others" variables (X_{05}, β = .13; X_{06}, β = -.13; X_{19}, β = -.17), two "other related attitudes" variables (X_{29}, β = -.17; X_{33}, β = .16), and one "structural" variable (X_{50}, β = .16).

Although the regression equations presented in Tables 4 and 5 should not be taken as recursive causal models,

Table 5.--Forty-eighth order partial regression coefficients predicting the use of the competency-based approach to instruction.

	Variable Name	b^1	β^2	Zero-Order Correlation
Criterion-specific influence from definers:				
X_{03}	FRIENDS	.00	.01	.24
X_{04}	FACULTY	.00	.04	.23
X_{05}	ADMINISTRATORS	-.00	-.03	.22
X_{06}	CONSULTANTS	.02	.13	.24
X_{07}	STAFF	-.01	-.13	.14
X_{08}	STUDENTS	.00	.01	.38
X_{09}	FACULTY MEETS	.00	.01	.07
X_{10}	BRIEF MEETS	.00	.04	.20
X_{11}	EXTENDED MEETS	.00	.00	.10
X_{12}	READINGS	-.00	-.01	.26
Indirect influence from definers:				
X_{13}	FRIENDS' TEACH PREF	-.05	-.01	.20
X_{14}	FRIENDS' INNOV	.69	.09	.19
X_{15}	FRIENDS' METHOD EFFECT	.08	.01	.29
X_{16}	FRIENDS' CBA BENEF	-.27	-.04	.27
X_{17}	FRIENDS' CBA RESOURCE	.37	.05	.30
Criterion-specific influence from models:				
X_{18}	FRIEND MODEL	.25	.07	.30
X_{19}	DEPT MODEL	-.58	-.17	.35
X_{20}	OWN COLLEGE MODEL	.05	-.01	.34
Relevant phenomenal reality:				
X_{02}	SELF-CONCEPTION	2.88	.82	.80
X_{21}	NO OF COURSES	-.08	-.03	.09
X_{22}	UNDERCLASS COURSES	.02	.08	.02
X_{23}	TEACHING ACTIVITY	.01	.03	.13
X_{24}	SOCIAL CONNECT	-.02	-.04	-.03
X_{25}	STATUS	.61	.10	.27
Other related attitudes:				
X_{26}	TEACHING PREF	.00	.01	.18
X_{27}	STRUCTURE PREF	.28	.04	.29

Table 5.--Continued.

	Variable Name	b^1	β^2	Zero-Order Correlation
X_{28}	TASK ORIENT	.26	.04	.27
X_{29}	OWN INNOVATION	-.74	-.17	.17
X_{30}	OWN OPENNESS	.53	.09	.11
X_{31}	BEHAVIORISM	-.23	-.04	.25
X_{32}	CBA HARMFULNESS	.13	.02	-.33
X_{33}	CBA SUPERIORITY	1.01	.16	.45
X_{34}	CBA INAPPROPRIATE	.11	.02	-.46
X_{35}	CBA EFFICIENCY	-.33	-.05	.47
X_{36}	CBA INCOMPATIBILITY	-.01	-.00	-.43
X_{37}	RESOURCES	-.52	-.10	.37
X_{38}	METHOD EFFECT	-.37	-.06	-.06
X_{39}	CHANGE ORIENT	-.42	-.09	.15
	Structural factors:			
X_{40}	PURE/APPLIED SCIENCE	1.30	.06	-.14
X_{41}	EDUC MEMBER	2.44	.09	.10
X_{42}	CLASS SIZE	-.00	-.01	-.04
X_{43}	SENIORITY	.08	.07	-.02
X_{44}	SEX	1.87	.08	.15
X_{45}	EDUC COURSES	-.11	-.02	.17
X_{46}	DECISION AUTONOMY	.45	.08	.08
X_{47}	AUTOCRACY IN DEPT	.23	.04	.02
X_{48}	DEPT INNOVATIVENESS	.09	.01	.14
X_{49}	CHAIRMAN INNOV	.47	.07	.22
X_{50}	DEPT OPENNESS	.64	.16	.21

$R = .86$ $R^2 = .75$ $N = 217$

Corrected for shrinkage $\hat{R}^2 = .68$ Overall $F = 3.71$ ($p < .001$)

[1] b = unstandardized partial regression coefficient.

[2] β = standardized partial regression coefficient.

the observed substantial interrelationships among the dependent and independent variables provide solid evidence that the theoretical factors suggested by the Woelfel-Haller formulation are of central importance in the process at work in forming attitudes toward teaching and teaching behaviors themselves. Below is presented an analysis of the degree to which the observed relationships among the variables used in this study correspond to the relationships predicted by the Woelfel-Haller formulation.

Observed vs. Predicted Relationships

In this research, the theoretical factors the Woelfel-Haller formulation depicts as causally related to attitude and behavior change have been operationalized by forty-eight variables (X_{03} through X_{50}). As long as each operational variable is measured separately and there is no single measure for each of the underlying theoretical factors they purport to measure, it is difficult to say anything about the observed relationships between each of the theoretical factors. However, at least two basic techniques are available to isolate the underlying dimensions; the most obvious is factor analysis. This technique may be seen to extract common factor variances from a set of measures. Factor analysis constructs the factor (or set of factors) that best represents the observed interrelationships among the operationalized variables. Unrotated, factor analysis

first generates the factor (or dimension) that explains the maximum amount of variance in the matrix, then the next best factor orthogonal to the first, and so on. Indices are then constructed by grouping individual measures in accordance with the factors they represent. Such indices can be seen to represent those underlying dimensions to which the several component measures are maximally related. In the context of the present analysis, however, amount of variance in the matrix explained by a factor does not constitute a meaningful criterion for the index. Rotation schemes are not able to resolve this problem.

The second basic technique for index construction involves the use of multiple regression. Basically, we assume that all variables used in a given index are partial measures of an underlying theoretical variable. Together with this assumption we may take advantage of the fact that associativity holds over the regression equation and thus sum the terms that constitute the operational measures across the theoretical variables. In the simplest case, the component measures of an index are entered into a multiple regression equation as predictor variables with yet another variable as a dependent variable. Each predictor variable is multiplied through by its regression coefficient (β) and these products are summed to form a single aggregate variable. This aggregate variable is the linear combination of the component measures, which is maximally correlated

with the dependent variable. Although fundamentally the same kind of procedure as factor analysis, this method of index construction assures that no predictor variables other than the ones meant to be included in the index are entered into the regression equation. The resulting index may be seen as that aggregate of component predictor variables which has the maximum relationship to the dependent variable controlling for other variables in the equation but not in the index.

Thus, for example, variables X_{03} through X_{12} constitute the operational measures of the variable "criterion-specific influence from definers." Variables X_{03} through X_{12}, then, in standardized form, may be multiplied by their respective standardized regression coefficients and summed through to provide an index of the theoretical variable "criterion-specific influence from definers." Based on this model, the following equations for the theoretical variables can be written:

(1) Self-conception (attitude)

$= X_{02}$ (Since attitude is assessed by one measure only, no new index is needed);

(2) Criterion-specific influence from definers

$= \beta_{04}X_{04} + \beta_{05}X_{05} + \ldots + \beta_{12}X_{12}$;

(3) Criterion-specific influence from models

$= \beta_{18}X_{18} + \beta_{19}X_{19} + \beta_{20}X_{20}$;

(4) Indirect influence from definers

$$= \beta_{13}X_{13} + \beta_{14}X_{14} + \ldots + \beta_{17}X_{17};$$

(5) Relevant phenomenal reality

$$= \beta_{21}X_{21} + \beta_{22}X_{22} + \ldots + \beta_{25}X_{25};$$

(6) Other related attitudes

$$= \beta_{26}X_{26} + \beta_{27}X_{27} + \ldots + \beta_{39}X_{39}$$

(7) Structural factors

$$= \beta_{40}X_{40} + \beta_{41}X_{41} + \ldots + \beta_{50}X_{50}.$$

Now that we have a technique for index construction, we may evaluate the theory that guides this research by comparing the predicted relationships among the theoretical factors to the observed relationships among the operational measures (indices) of the theoretical factors.

For example, the theory predicts that the effects of information flow variables (i.e., #2 through 6 above) on the behavior under study are mediated by the attitude toward that behavior. That is, the Woelfel-Haller formulation assumes that information flow variables affect the formation of attitude insofar as they provide or filter information. The attitude, in turn, is assumed to be the sole causal influence on subsequent behavior. Thus, the theory predicts that when the effects of attitude on behavior are controlled, the influence of information flow variables on behavior will more or less disappear.

To partially validate this prediction, the thirty-seven variables used in the study to operationalize

"information flow" (X_{03} through X_{39}) were collapsed into the five component indices of "information flow" by means of equations (2) through (6) above. Two multiple regressions were then performed. First, all five information flow indices were used as predictors of the behavioral measure. Second, the regression was repeated with the attitude measure (X_{02}) added as an additional predictor variable. The results of these calculations are presented in Table 6. As is evident, if the effects of self-conception (attitude) on behavior are controlled, the influence of the information flow variables on behavior (represented in Table 6 by the Beta coefficients) is drastically reduced. In fact, when controlling for attitude, the regression coefficients of the information flow indices closely approach a zero value (i.e., Beta coefficients range from .017 to .142--compared to Beta coefficients of .075 to .508 when the effects of attitude are not controlled for). The only exception is the index for "indirect influence from definers," whose Beta coefficient remains unaffected when controlling for the attitudinal variable. This latter finding is not predicted by the theory.

Further evidence for the attitudinal variable's mediating effect of the information flow variables on behavior may be gained from a slightly different perspective. Three regressions were performed using the behavioral variable (X_{01}) as a criterion variable. First, using the

Table 6.--Regression of indices of information flow variables on the use of the competency-based approach to instruction (behavior) with and without controlling for the effects of self-conception (attitude) on behavior.

Indices of Information Flow Variables	4th Order Partial Regression Coefficients (Without Controlling for Attitude) β	5th Order Partial Regression Coefficients (Controlling for Attitude) β
Criterion-specific influence from definers	.075	.017
Indirect influence from definers	.104	.109
Criterion-specific influence from models	.224	.022
Relevant phenomenal reality	.250	.074
Other related attitudes	.508	.142

information flow variables (X_{03} to X_{39}) accounts for 50 percent of the variance in behavior. Second, using the self-conception measure (X_{02}) as a predictor variable accounts for 64 percent of the variance. Finally, by entering both the information flow variables and the self-conception measure as predictors in the regression equation, a total of 71 percent of the variance in behavior was explained. Since variances are additive, we have evidence that most of the variance explained by the information flow variables is the same variance explained by the self-conception measure. And since the information flow variables are assumed to occur prior to the self-conception, we have further evidence that the self-conception "absorbs" the effects of information flow variables, and, in turn, determines subsequent behavior.

A further validity check of the theory underlying this research may be obtained by analyzing yet another relationship. As is evident from Chapter II, the theoretical formulation argues that attitude is formed solely by informational processes. Factors that identify the individual in the larger social structure (structural factors) do not transmit any information to ego. Rather, they are thought to influence attitude only insofar as they have a determining effect on the sources of information to which ego is exposed. Thus, the theory predicts that any observed relationship between structural factors and attitude will be

reduced if the effects of information flow variables on attitude are controlled.

To partially verify this prediction, an aggregate measure of the eleven structural variables used in the study (X_{40} to X_{50}) was arrived at by means of equation (7) (p. 84). This index was then used to predict the self-conception measure (X_{02}). A second regression added the information flow variables (X_{03} through X_{39}) to this index to predict self-conception. A comparison of these two regression equations is presented in Table 7. The results indicate that, as predicted, the Beta coefficient associated with the structural factor index drops from $\beta = .239$ to $\beta = .163$ when the effects of the information flow variables are controlled. One might expect a somewhat lower Beta upon controlling for information flow variables. However, this study has not exhaustively operationalized all information sources relevant to teaching attitudes. It is entirely feasible that as more information flow variables are measured and controlled, the influence of structural variables on self-conception will approach zero.

The same mediating effect of the information flow variables may be observed by comparing variances explained in the self-conception measure. The structural variables are able to account for 6 percent of the variance in the self-conception measure. The information flow variables explain 64 percent of the variance in the same criterion

Table 7.--Regression of index for structural variables on the self-conception (attitude toward the use of the competency-based approach to instruction) with and without controlling for the effects of information flow variables on self-conception.

Index	Zero Order Regression Coefficient (Without Controlling for Information Flow Variables) β	37th Order Partial Regression Coefficient (Controlling for Information Flow Variables) β
Structural factors	.239	.163

measure. Finally, the information flow variables combined with the structural variables account for a total of 66 percent of the variance. Thus, we have further evidence that the information flow variables "absorb" most of the variance explained by the structural variables.

Again, it must be emphasized that because of the nonrecursive nature of the relationships among the variables as measured in this study, the reported findings must be interpreted with extreme caution. Nevertheless, the observed relationships among the variables appear to confirm the relationships predicted by the theory that guided the collection and analysis of the data for the study.

Relative Effects of Variables on Attitude Formation

As an interactionist theory, the Woelfel-Haller formulation implicitly assumes that interpersonal sources of information, and especially information from "significant others," will be of greatest consequence in terms of attitude formation. However, as the theory now stands, it does not stipulate the relative importance of each explanatory variable in the system. Clearly, the problem of relative importance is an empirical one. This section attempts to provide some initial estimates of the effectiveness of each theoretical explanatory factor vis-à-vis the other explanatory factors in the system.

To this end, a variant of the index construction technique described above was used (Woelfel and Haller, 1971b). This variant enters the component variables of an index as independent variables into the multiple regression equation along with all other independent variables used to predict the criterion variable. When the component variables of the index are then multiplied through by their regression coefficients and summed, the resulting index may be seen as that linear aggregate of the component variables maximally related to the criterion variable controlling for all the other independent variables present in the regression equation.

Accordingly, all independent variables used in this research (X_{03} through X_{50}) were used simultaneously to predict the self-conception measure (X_{02}). Each variable was then multiplied through by its regression coefficient. These terms were summed according to equations (2) through (7) (pp. 83-84) to obtain the following indices: (1) criterion-specific influence from models, (2) criterion-specific influence from definers, (3) indirect influence from definers, (4) relevant phenomenal reality, (5) other related attitudes, and (6) structural factors.

These six indices were then used to predict the self-conception measure (X_{02}). Table 8 shows the standardized partial regression coefficients (β) for each of the six indices. These partial regression coefficients represent

Table 8.--Fifth order partial regression coefficients of independent indices on self-conceptions as users of the competency-based approach to instruction of 217 faculty members.

Indices	β[1]	F	Significance	N
Criterion-specific influence from definers	.09	1.39	.243	119
Criterion-specific influence from models	.41	27.10	.000	187
Indirect influence from definers	.12	2.46	.122	192
Relevant phenomenal reality	.14	3.61	.062	162
Other related attitudes	.66	72.95	.000	169
Structural factors	.34	19.86	.000	120

$R = .82$ $R^2 = .68$ Overall $F = 2.67$ ($p < .001$)

[1] β = partial regression coefficient.

the impact of each index on self-conception (attitude), controlling for all the other indices in the equation.

Before interpreting Table 8, a few comments regarding the technique of index construction are in order. Although the technique used to arrive at a single value for each theoretical variable may appear to be a liberal procedure, it is essentially a conservative strategy. It is important to keep in mind that the multiple correlation coefficient is unaffected by this procedure, and in fact turns out to be the same as it would have been had the variables been entered singly as predictors. (Note the R and R^2 values in Tables 4 and 8. Slight discrepancies exist because the multiple correlation in Table 8 is based on a lower N as a result of the compounding effect of missing data when summing the component measures of indices.)

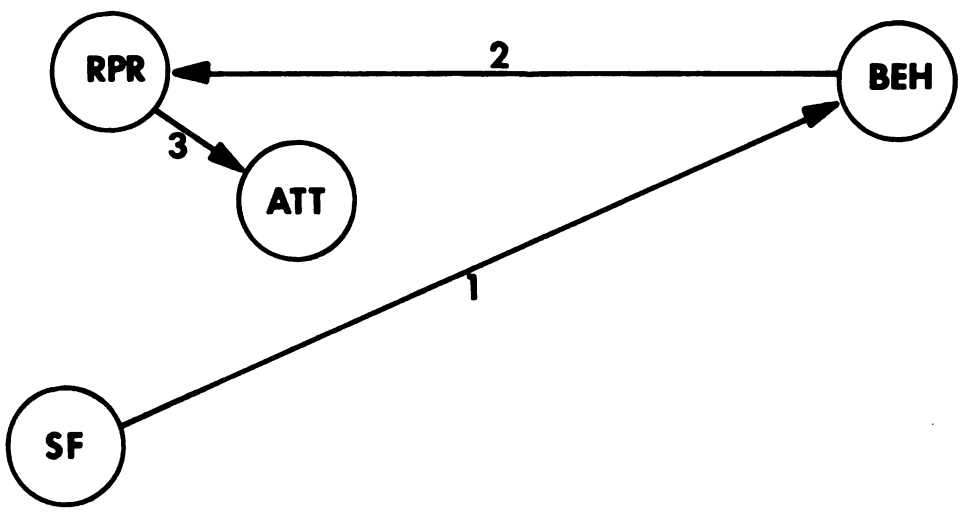
Because of the potential nonrecursive relationships among the variables, the coefficients presented in Table 8 are probably somewhat inflated and thus must be interpreted with caution. Nonetheless, Table 8 is able to present an estimate of the relationship between each index and the dependent attitude controlling for the other predictor indices in the equation. Or, stated differently, this table presents the relative importance of each index in forming the attitude under study here.

Of primary interest is the size of the partial regression coefficient of the index "criterion-specific

influence from definers." In discussing the regression equation using all forty-seven independent variables singly as predictors of the self-conception (Table 4), the lack of substantial relationships between direct definer type variables and attitude was already noted. Table 8 views the aggregate of these variables in relation to all other indices. The observed Beta of .09 confirms the finding that the mean verbal communications from others exerts only a moderate effect on the formation of teaching method attitude. The effect of this index contrasts sharply with the index representing direct influence from models. Its relatively high Beta of .41 indicates that observed teaching behaviors by others is a powerful force in the teaching attitude formation process.

As Table 8 shows, with Betas of .12 and .14, respectively, indirect influence from definers and relevant phenomenal reality are only moderately related to the criterion variable. However, with a Beta of .66, other related attitudes appear to play a central role in forming and supporting attitudes toward teaching approaches. Finally, the effects of structural factors on the dependent attitude are also worthy of consideration ($\beta = .34$). With regard to this latter value, however, the theory does not predict any substantial <u>direct</u> relationship between the structural factors and the dependent attitude. The relatively high Beta observed for the structural factors points to at least two

possibilities: (a) the information flow variables as operationalized in this study have not been measured exhaustively, and/or (b) there is a direct link between structural variables and the dependent behavior (i.e., structural variables either facilitate or inhibit the desired teaching behavior), which, in turn, has a causal effect on the attitude toward that behavior. As Figure 2 shows, this latter finding is not unanticipated by the theory guiding the investigation. The individual's own behavior may become an aspect of ego's relevant phenomenal reality, which, of course, is assumed to have a determining effect on ego's self-conception.



SF = Structural Factors
ATT = Attitude (Self-Conception)
BEH = Behavior
RPR = Relevant Phenomenal Reality

Numbers indicate sequence of hypothesized events.

Figure 2.--Hypothesized relationship between structural factors (SF) and behavior (BEH).

On several occasions, the lack of any substantial relationships between criterion-related information from definers (X_{03} through X_{10}) and self-conception was noted. As Table 5 shows, the effect of a change of favorable coverage from fellow faculty members (X_{04}), for example, could not exceed a change of one-hundredth of a standard unit in self-conception. This does not mean that testimony from fellow faculty members is without effect, since a manyfold increase is not outside the range of the faculty variable. However, the relatively low effect of this variable becomes pronounced when contrasted with the model-type variables. For example, one standard unit change in the model provided by one's department (X_{19}) is responsible for a change of more than three-tenths of a standard unit in self-conception. That is, the impact of the example set by one's department appears to be roughly thirty-four times as great as the impact of the verbalizations of fellow faculty members ($\frac{\beta}{\beta} = \frac{.34}{.01} = 34$).

Most of the other nine definer-type influences as measured in this study appear to be of about the same low effectiveness as the faculty variable just discussed. The relative effect of each of the criterion-specific information variables can be meaningfully assessed by comparing their respective unstandardized slopes (b_{xy}), since all are measured on the same scale. Communications from friends (X_{03}), administrators (X_{05}), staff (X_{07}), and faculty

meetings (X_{09}) show a relationship with self-conception that is roughly ten times as great as is that of messages from fellow faculty members $\frac{b_x}{b_{04}} = \frac{.001}{.0001} = 10$); messages from consultants (X_{06}) and extended meetings (X_{11}) are roughly twenty times as effective ($\frac{b_x}{b_{04}} = \frac{.002}{.0001} = 20$); brief meetings ($X_{10}$) show an effect thirty times as great as the faculty measure ($\frac{b_{10}}{b_{04}} = \frac{.003}{.0001} = 30$); students are three times as effective ($\frac{b_{08}}{b_{04}} = \frac{.0003}{.0001}$); and the net relationship of readings (X_{12}) is four times as great as the faculty index ($\frac{b_{12}}{b_{04}} = \frac{.0004}{.0001}$).

However, as expression 7 (Appendix A) indicates, these ratios may be viewed as a composite of the mass and relevance of the messages from each source of information. As the discussion in Appendix A shows, the relevance of a message from an information source is given by the partial correlation between the information index and the dependent variable. By substituting the appropriate partial correlations into expression 7 we can control for the relevance and calculate the masses of each of the variables as a proportion of the mass of any one of the sources of information. Using the faculty index (X_{04}) as a standard that will be expressed as unity (i.e., mass of $X_{04} = 1.00$), the results in Table 9 may be computed.

Table 9 shows that information about teaching methods coming from each of the ten sources under analysis here is of very low relevance to the self-conception measure. Brief

Table 9.--Inertial masses of unit messages from ten sources of information expressed as a ratio to the mass of a unit message from FACULTY (X_{04}) [Y = X_{02}, attitude toward the use of the competency-based approach to instruction].

Sources of Information		$b_{x_i y}$ (Net Effect)	$r_{x_i y(j...m)}$ (Relevance)	$\frac{b_{x_i y}}{r_{x_i y(j...m)}}$ (Effect when Relevance = 1.00)	$\frac{1.00}{\text{Mass of } X_{04}}$	m_x (Intertial Mass)
X_{03}	FRIENDS	-.0010	.074	.014		1.40
X_{04}	FACULTY	.0001	.010	.010	100	1.00
X_{05}	ADMINISTRATORS	.0010	.029	.034		3.40
X_{06}	CONSULTANTS	.0020	.041	.049		4.90
X_{07}	STAFF	.0009	.070	.013		1.30
X_{08}	STUDENTS	-.0003	.031	.010		1.00
X_{09}	FACULTY MEETS	-.0008	.026	.031		3.10
X_{10}	BRIEF MEETS	.0032	.106	.030		3.00
X_{11}	EXTENDED MEETS	-.0018	.058	.031		3.10
X_{12}	READINGS	-.0004	.024	.016		1.60

meetings (X_{10}) seem to be most relevant (.106), and messages from fellow faculty members (X_{04}) are least relevant (.010). As the values in the third column ("Effect When Relevance = 100") indicate, the effects of a unit message from each source stand to increase anywhere from tenfold (brief meetings, X_{10}) to onehundredfold (fellow faculty members, X_{04}) if the information was maximally relevant to the dependent measure.

Table 9 shows that of the ten information sources used here, educational consultants (X_{06}) have the highest masses per unit of information (more than four times the mass of a unit message from fellow faculty members (X_{04}). This finding confirms the expectation that educational consultants, with their expertise and inherent credibility in instructional matters, have a greater potential impact on attitude toward instructional approaches than all other sources of verbal information. However, because of the low relevance of this information (.041), this potential is not being realized. The observed mass of information from administrators (X_{05}) is roughly three times the mass of messages from faculty members. Messages from meetings (X_{09}, X_{10}, X_{11}) are characterized by approximately the same masses as words from administrators. The remaining sources of information have generally the same masses per unit of information as information from fellow faculty members.

It must be pointed out that because of the nonrecursive nature of the relationships among the variables and the assumptions used to compute the values in Table 9, the estimated inertial masses of per unit messages from various sources of information must be interpreted very cautiously. However, as far as the accuracy of the techniques used to calculate the masses is concerned, an evaluation is available. As Woelfel and Hernandez (1972) pointed out,

> . . . while different messages should be differentially relevant for different attitudes and in different contexts, the masses of the unit messages should be constant no matter the setting or dependent variable. This means that another set of estimates of these masses calculated from a different regression equation with a different dependent variable should yield different estimates of relevance, but the same estimates of inertial mass (p. 20).

Accordingly, a new set of estimates based on the effectiveness of the ten different sources of information over the actual use of the competency-based approach to instruction (X_{01})--a behavioral rather than an attitudinal variable--was computed. These results are shown in Table 10. As is evident from this table, within the limits of accuracy to be expected from this analysis, the estimates of the inertial masses of per unit messages from the different sources of information remain the same.

Summary

This chapter has presented four sets of rough estimates relevant to the purpose of this study. First, multiple

Table 10.--Inertial masses of unit messages from ten sources of information expressed as a ratio to the mass of a unit message from FACULTY (X_{04}) [Y = X_{01}, use of the competency-based approach to instruction].

Sources of Information		$b_{x_i y}$ (Net Effect)	$r_{x_i y(j...m)}$ (Relevance)	$\frac{b_{x_i y}}{r_{x_i y(j...,)}}$ (Effect When Relevance = 1.00)	$\frac{1.00}{\text{Mass of } X_{04}}$	m_x (Inertial Mass)
X_{03}	FRIENDS	-.0026	.043	.060		1.03
X_{04}	FACULTY	.0028	.048	.058	17.25	1.00
X_{05}	ADMINISTRATORS	-.0003	.002	.150		2.58
X_{06}	CONSULTANTS	.0302	.143	.211		3.62
X_{07}	STAFF	-.0047	.083	.057		.98
X_{08}	STUDENTS	-.0003	.008	.043		.74
X_{09}	FACULTY MEETS	.0006	.004	.132		2.28
X_{10}	BRIEF MEETS	.0141	.107	.131		2.26
X_{11}	EXTENDED MEETS	-.0045	.033	.136		2.34
X_{12}	READINGS	-.0014	.021	.066		1.14

correlation coefficients were presented, which strongly suggest that the model under investigation here allows fairly accurate levels of prediction of attitude and behavior toward a teaching approach.

Second, in the process of hypotheses testing, a set of variables was constructed, which operationalize the theoretical variables originally described (i.e., other related attitudes, structural factors, etc.). The observed relationships between these measures were found to be in agreement with the relationships predicted by the theory.

Third, the findings included estimates of the relative importance of the theoretical variables in determining attitude toward the competency-based approach.

Finally, Chapter IV presented estimates of the relative effects of different sources of information on teaching attitude and teaching behavior.

Chapter V contains a summary of the present study. It also attempts to assess the general utility of the Woelfel-Haller formulation in studying the process of change in higher education and to derive some implications of the present findings for change agents in higher education.

CHAPTER V

SUMMARY AND CONCLUSIONS

Introduction

This chapter presents a general summary of the theory underlying this research, the design of the study, and the major findings. Based on this summary, conclusions are presented regarding: (1) the applicability of the Woelfel-Haller model to the study of change, and (2) the process of forming attitudes toward the competency-based approach. Finally, some implications for educational practice and future research are stated.

Summary

This research was based on the assumption that if educational change agents are successfully to intervene in and redirect the process of change in higher education, they must have available to them a valid model of the change process.

A recently developed theoretical perspective holds that the great many factors past research has found to be related to change in some form or another may simultaneously be examined in terms of the information they represent or control, and that this underlying dimension may be viewed as

a "motor force" toward behavior. Briefly stated, this theory deals with the following variables: (1) the behavior of an individual, (2) the attitude toward that behavior (self-conception), (3) other related attitudes, (4) others' influence, (5) relevant phenomenal reality, and (6) structural factors. It is argued that the attitude toward behavior exerts direct causal influence on subsequent behavior, whereas the remaining four variables affect the formation of the attitude insofar as they provide, filter, or control information. The theory assumes that attitudes are informational structures and are formed solely by information processes. It is argued that an individual cannot react selectively to divergent expectations. Rather, his attitudes are posited to be a composite of all information received. Specifically, the theory predicts that an individual's attitude will converge on the mean of all information to which he is exposed.

The theory suggests that when attitudes are defined as proposed rates or pseudo-rates of behavior each source of information may be construed as a force applied at some angle (θ) to the dependent attitude. When a given source of information presents the individual with multiple influences, they may be aggregated by taking the arithmetic mean. The relative net effect of the forces can be resolved along the dependent vector by linear regression techniques. By taking into consideration the angle (θ) between each

information source vector and the dependent vector, the relative potential effect of the information sources may also be ascertained.

The attitudinal object of this study was the individual's conception of himself as a user of a systems approach ("competency-based approach to instruction") to his teaching activities. From the theory it was hypothesized that a faculty member's attitude toward the use of this approach is a consequence of his being exposed to information that defines an attitude appropriate for him.

The purpose of the present study was twofold. First, it was to assess the degree to which the observed relationships among the operationalizations of the theoretical factors correspond with predicted relationships. Second, the study was intended to provide data regarding the relative importance of the operational measures in forming and supporting attitudes toward the use of the competency-based approach. Accordingly, the design of the study provided for the scaling of the self-reported responses of 217 faculty members on (a) the dependent behavior (actual use of the competency-based approach to instruction), (b) the self-conception (attitude), and (c) a set of variables that provide, filter, or control information related to teaching approaches. Regression analysis was the basic tool used for data analysis.

With regard to the first purpose of the study, it was found that the operational measures of the theoretical causal factors can account for roughly two-thirds of the variance in the self-conception measure. As predicted, this self-conception measure was found to mediate most of the effects of the informational factors on the behavioral measure under study. Furthermore, the fact that the self-conception measure was observed to account for well over 60 percent of the variance in the behavioral variable confirmed the expectation that the attitude exerts direct influence on subsequent behavior.

With respect to the question of relative effectiveness of independent variables on the self-conception measure, the data indicated that the theoretical factor "other related attitudes" was most important in forming and supporting attitudes toward teaching approaches. This effect was observed to be closely matched by a second theoretical factor representing information transmitted to faculty members. This informational factor consists of various subcomponents. It was found that the subcomponent assessing observed teaching behaviors of models is most important in forming one's teaching attitude. A second subcomponent, "verbal information communicated by others," was found to be only moderately related to the self-conception. Indeed, five out of ten variables assessing verbal information were found to be negatively related to the dependent attitude--a finding not

anticipated by the theory. However, it was found that virtually all of these verbalizations were only marginally relevant to the attitude under study here. It was estimated that if the information from these sources was made maximally relevant to the self-conception measure, their effect would increase from ten to onehundredfold, depending on the information source. It was found that in reference to other sources of verbal information, educational consultants seem to have the greatest potential impact on one's attitude toward teaching approaches.

Conclusions

For several reasons, a great deal of caution must be exercised in the interpretation of the results generated by this investigation. First, we are dealing with a post-hoc study that inherently suffers from a variety of limitations. In this respect, the lack of control over extraneous factors is of special importance. Second, since the measures used in this research were based on self-reports, there is some question about their validity. Third, the theory predicts reciprocal relationships among some of the variables in the model. However, since the observed relationships in this study have been treated as strictly recursive influences, some of the relationships are potentially inflated.

However, despite the qualifications that can and should be made, several conclusions may be drawn from the

investigation. These conclusions lie in the area of the social psychological study of the process of change, and in the explanation of changes in teaching attitudes. For purposes of clarity, these two areas will be dealt with separately.

Viability of the Woelfel-Haller Formulation

The results of this research, in its present operationalization and in the present sample, offer substantial support for the general utility of the theoretical perspective underlying this study. The explanation of two-thirds of the variance in the measured self-conception and the behavioral variable compares favorably with the coefficients of determination obtained in earlier investigations that utilized the same theoretical formulation (Woelfel and Haller, 1971a [aspiration attitude]; Woelfel and Hernandez, 1972 [attitude toward marijuana smoking]; Woelfel et al., 1974 [attitude toward French Separatism in Canada]; Mettlin, 1973 [attitude toward smoking]). Thus, there is reason to believe that the model is at least as applicable to teaching behavior and the formation of attitudes toward teaching approaches as it is to the study of behaviors and attitudes previously investigated. Furthermore, the data presented in Chapter IV support the theory's central contention that the effects of diverse variables on attitude and behavior

formation may be examined simultaneously in terms of the information they represent or control.

Beyond the fact that two-thirds of the variance in the dependent variable could be explained, at least three additional observations supported the conclusion that the Woelfel-Haller formulation is a viable model for studying change.

First, this study was able to provide partial support for the model's contention that the relationship between social structural factors and the attitude under consideration is essentially nonexistent when controlling for the intervening informational processes. This finding indicates that the numerous social structural variables past research has found to be related to the adoption of new ideas and behaviors may be significant only to the extent that they have a determining effect on the kind of information to which an individual is exposed.

Second, the data confirmed the theory's prediction that information has an effect on teaching behavior only insofar as it determines the value of the attitude underlying that behavior.

Finally, the results of the present study revealed the central importance of "other related attitudes" in attitude formation and change. That is, it appears that an individual's attitude toward a given behavior is anchored within a constellation of related attitudes. Any change in

this constellation exerts a substantial direct effect on the attitude under consideration. This is wholly consistent with the theoretical notion that an individual's attitudes depend on his orientation to those larger cognitive categories ("filter categories") upon which his definition of object and of self depends. Thus, it seems that it is not only theoretically justifiable but practically useful to assume that individuals define objects by placing them into filter categories, and that attitudes toward those categories govern attitudes toward the object in question.

It is important to point out that, although part of the data analysis was based on the assumption that the dependent attitude will converge on the mean of all information received, this study did not attempt directly to test this prediction. However, based on this prediction, we would expect that all informational variables are positively correlated with the dependent variable. Despite the finding that all ten "information from definers" variables (cf. variables X_{03} through X_{12}, Table 4) indeed showed positive zero-order correlations, no less than five showed slightly negative correlations when the effects of all other independent variables were partialed out. The question of whether these negative signs are indicative of the true relationships or are a result of measurement error cannot be resolved here. However, this question is crucial to the theory's assumptions regarding information processing.

Should future research confirm these negative correlations, the information processing aspects of the theory would need to be modified to account for such findings. Indeed, some attempts in this respect were already presented in Woelfel and Saltiel (1974).

Competency-Based Attitude Formation

The results of this study indicated that a substantial part of the variability in attitudes and behaviors toward the competency-based approach can be explained by essentially two sets of variables: (1) informational variables and (2) other related attitudes.

Informational variables.--Verbal information about the competency-based approach to which faculty members in the present sample are exposed appears to have only limited effects on actual teaching behaviors. This limited effect can be partially explained by the fact that current verbal information dealing with the competency-based approach is virtually irrelevant to one's teaching behavior. That is, it appears that the attitude being formed as a result of current information about the competency-based approach is more or less unrelated to the actual use of this teaching approach.

On the other hand, the data provided considerable evidence that the attitude toward the use of the competency-based approach is influenced by observed teaching behaviors

of people who serve as models. This finding is consistent with the work of social psychologists such as Bandura and his colleagues, who have long recognized the importance of modeling on attitude and behavior. In this regard, the present research provides confirmation of highly respected theory.

The findings regarding informational variables suggest that, when considering the resistance of a faculty member to changes in teaching behavior, it is necessary to examine the number of messages from different sources of information that urge him to use whatever teaching approach he is using. If a teaching faculty member is continually exposed to models and definers who themselves use an "undesirable" teaching approach and expect the faculty member in question to do the same, his self-conception and teaching behavior will be rather difficult to change. That is, a change in the desirable direction would necessitate a great deal of information counterbalancing the information to which he is routinely exposed. Furthermore, because the effects of influence are cumulative and cannot be nullified, sudden significant changes in one's use of teaching approaches are extremely unlikely. Rather, changes can be expected to occur more or less gradually, with the individual teacher slowly moving toward the newly advocated approach.

Other related attitudes.--By far the most important variables related to attitudes toward the use of the competency-based approach are those representing other related attitudes. These include perceived characteristics of the competency-based approach, and one's orientation toward such objects as teaching, innovation, and so on. It appears that such related attitudes are of central importance in forming and supporting one's expectation of the degree to which the competency-based approach should be used. It seems that any changes in this expectation would necessitate concurrent changes in the cluster of attitudes supporting this expectation.

The results of this investigation may help us to understand better how it is possible for so large a proportion of the teaching faculty to continue in their traditional teaching approaches in the face of substantial criticisms concerning the inefficiency and ineffectiveness of these approaches. This study makes it apparent that a faculty member's concern about his effectiveness as a teacher is but one of a number of attitudes related to the use of the competency-based approach. Although one's effectiveness as a teacher is important, the present data suggest that when an advocated teaching approach is believed to be in conflict with one's educational philosophy, the effect of this belief may well prevent any significant move toward the advocated approach--especially when such a belief

is important to one's self and is continually supported by other agents of influence.

Implications for Change Agents

On a most general level, it may be said that despite the fact that the theory underlying the present investigation is still in its infancy, nevertheless the present findings suggest that the educational change agent has available to him a potentially viable model of change. The central concept of information as a motor force toward change renders this model sufficiently general that it may assimilate most if not all factors past research has found to be related to change.

An exploration of implications on a more specific level requires a consideration of the generality of the present findings.

Inferences From the Sample to the Population

It must be kept in mind that this study obtained usable responses from only about three-fifths of the random sample initially selected. The fact that data could not be obtained from all subjects in the random sample makes it mandatory that inferences to the population under study (faculty at Michigan State University) be made with caution. Inferences to other populations (faculty at other major universities) are even more tenuous. Therefore, any

discussion of the present findings must be regarded as referring primarily to the sample of the present study.

Inferences to Other Dependent Variables

The dependent variable of the present study is, of course, the competency-based approach to instruction. As indicated in Chapter I, this particular dependent variable was selected for two reasons: First, it lent itself as a vehicle to examine the change process in higher education from the theoretical perspective suggested by the Woelfel-Haller formulation. Second, on a practical level, the diffusion of the competency-based approach is very high on the priority list of a great many change agents in higher education. Consequently, the Woelfel-Haller model was operationalized around the use of the competency-based approach to instruction. The findings of the present study exclusively refer to this variable. It is clear that, given other dependent variables, different measures for the critical theoretical variables (others' influence, other related attitudes, etc.) would have to be employed. Assumptions regarding the applicability of the Woelfel-Haller model to other dependent variables used to study the change process in higher education are directly related to the generality of the model. However, additional research is needed before any statements about the general validity of the Woelfel-Haller model can be made.

Potential Strategies for Diffusing the Use of the Competency-Based Approach: An Example

It must be kept in mind that this study was designed to determine the applicability of the Woelfel-Haller model to the study of change in higher education. Since it was not designed to generate change strategies, no such guidelines will be presented. Nevertheless, an attempt will be made to illustrate how knowledge about the change process obtained from an application of the Woelfel-Haller model may suggest appropriate change strategies. For this purpose, let us assume that a change agent is faced with the task of disseminating the competency-based approach to the faculty members who served as subjects in the present study.

On a general level of decision making, the potential impact of a concerted effort to diffuse the competency-based approach may, in part, be evaluated by an interpretation of the findings of this study. The theory guiding this research suggests that attitudes formed on the basis of limited information are more susceptible to change than are attitudes formed on the basis of substantial informational input. The observation that (1) faculty members are most influenced by the teaching behavior of their models, and (2) current verbal messages about teaching approaches are not very relevant to teaching attitude seems to indicate that faculty members have not received such great amounts of teaching-related information as to make their teaching attitudes

resistant to change. Accordingly, a concerted effort to expose faculty members to massive amounts of relevant information about the use of the competency-based approach might well result in significant changes in their teaching behavior.

In devising specific strategies, the change agent would direct his major efforts toward the most critical variable, namely the attitude of faculty members toward the use of the competency-based approach. However, the results of the study indicate that this attitude is embedded in a cluster of related attitudes (i.e., preference for teaching, task orientation, perceived characteristics of the competency-based approach, etc.). Thus, the task of the change agent is to change not only the variable underlying the use of the competency-based approach, but also the related attitudes that support this variable.

Given the finding that observing teaching behaviors acts as a powerful force in determining one's own teaching attitude, the change agent might attempt to publicize existing teaching programs characterized by the competency-based approach. Furthermore, based on the finding that observing teaching behavior in one's own department is of particular importance in determining teaching behavior, the change agent might be well advised to encourage departmental administrators to demonstrate to their own faculty teaching models that represent the use of the competency-based approach.

At the same time, the change agent would also want to influence the verbal information about the competency-based approach to which faculty members are exposed. Assuming that the change agent has control over several sources of information (e.g., written materials, seminars, workshops, consultations, etc.), an effective strategy would make use of those sources of information that have the greatest potential impact on teaching behavior. In the present context, educational consultants and administrators would be used as primary sources of information dissemination. Also, since information obtained in meetings was shown to be more effective than information obtained in interpersonal situations, the use of meetings of all sorts would be heavily emphasized in presenting verbal information about the competency-based approach.

The specific change strategies would depend, of course, on such factors as time available to bring about significant changes, control over information channels, and availability of other resources. Again, the reader is reminded that the above-mentioned change strategies are only illustrative of the use to which knowledge about the change process might be put. More meaningful change strategies can be derived from highly decision-oriented research. The present study, of course, was designed only to provide decision-oriented research with a new perspective from which to view change in higher education.

Recommendations for Future Research

The overall validity of the theoretical formulation that guided this research has been established in a number of investigations--including this one. However, all these investigations have used research designs that have allowed for little or no physical manipulation of the critical variables. In light of the nonrecursive nature of the model, however, the estimation of unbiased relationships on the basis of nonexperimental data presents some serious statistical difficulties. Despite the fact that techniques for the solution of these problems are rapidly becoming known to the social sciences (Van de Geer, 1971), it has become increasingly clear that numerical manipulation of nonexperimental data is insufficient. As Woelfel and Haller (1971a) wrote:

> What is clearly needed at this stage of theoretical development is an experimental design in which the variables are physically manipulated rather than statistically controlled. Such a design is not only possible but feasible since the key variables . . . are themselves amenable to at least some physical manipulation (p. 86).

As far as the study of change in teaching attitudes and behaviors in higher education is concerned, it is hoped field experiments generated by the present theory will provide answers to such questions as (a) Can the predicted relationships between the theoretical causal factors and teaching attitudes also be confirmed when the variables are physically manipulated? (b) What are the exact weighting

factors to be assigned to the messages from different sources of information? (c) What makes a unit message from one source of information more effective than an identical message from a different source? (d) What makes a certain kind of message more relevant to the teaching attitude than other kinds of messages? The answers to such questions will have as much theoretical import as they may have for the effective control of the process that governs changes in attitudes toward teaching approaches.

To be sure, any meaningful application of the theory in field experiments will pose considerable scaling problems, particularly since the scaling requirements of this model are severe, calling in the ideal case for continuous ratio scaling as a prerequisite. While pseudo-rates for the dependent variables as used in the present research may be satisfactory, recent developments in multidimensional scaling (Woelfel and Saltiel, 1974) may well prove that this scaling model is a far superior measurement instrument.

APPENDICES

APPENDIX A

THE CONCEPT OF RELEVANCE EXPLAINED

APPENDIX A

THE CONCEPT OF RELEVANCE EXPLAINED[1,2]

To explain the concept of relevance, let us begin by reconsidering expression (4) which was introduced on page 47 in Chapter II. We may restate this expression for the case where the dependent attitude Y is a function of three sources of influence: $\bar{X}$ = the old attitude, $\bar{V}$ = advocated position by messages from source V, and $\bar{W}$ = advocated position by messages from source W.

$$(4.1)\quad \bar{Y} = \bar{X}\frac{m_x N_x}{m_x N_x + m_v N_v + m_w N_w} + \bar{V}\frac{m_v N_v}{m_x N_x + m_v N_v + m_w N_w} + \bar{W}\frac{m_w N_w}{m_x N_x + m_v N_v + m_w N_w}$$

This expression can be seen to hold only for the one-dimensional case. Such a case obtains when both the dependent attitude (Y) and the information pertaining to this attitude are measured along the <u>same</u> scale or <u>vector</u>. Such a one-dimensional vector space would hold, for example, if an individual were asked, "How many research articles do

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[1]The reader is urged also to consult the original source underlying this discussion (Woelfel & Hernandez, 1972).

[2]Expressions in this Appendix are developed parallel to the expressions presented in Chapter II. Consequently, a parallel numbering system for the expressions is used (e.g., 4 → 4.1).

you expect to submit for publication?" and all of his sources of information measured in terms of how many research articles they expect the individual to submit for publication. In this case, of course, both the influence and the dependent outcome are measured along the same vector, namely "number of research articles expected to submit for publication." When additional sources of influence not measured along the same vector are introduced, we are dealing with a multidimensional space. For example, the individual's activity in the administration of his department may exert some force toward number of research articles submitted for publication, but it may exert other parts of its force in different directions, such as greater or lesser interest in teaching, politics, etc. Accordingly, only part of the force in this independent variable is realized along the dependent vector. This is to say that the impact of an independent variable is proportional not only to the amount of energy it contains, but also to its relevance to the dependent measure.

The solution to the problem of how to estimate the impact of a partly relevant source of influence on the dependent variable is diagrammatically depicted in Figure A1.

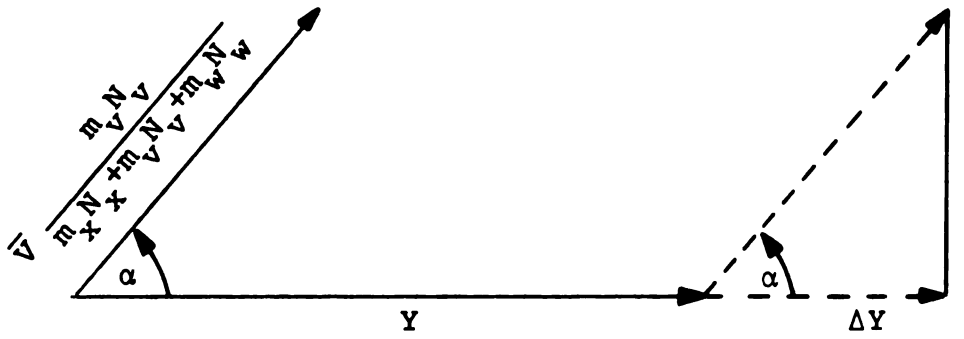

Fig. A1.--Resolution of impact of change message on the original vector of the dependent variable.

Where:

Y = the original attitude vector;

$\bar{V}\dfrac{m_v N_v}{m_x N_x + m_v N_v + m_x N_x}$ = the potency (i.e., momentum) of the change message to which the individual is exposed;

α = the angle at which the change message is applied to the dependent attitude;

ΔY = amount of change in the original attitude vector due to the change message.

Figure A1 illustrates the case where the information from source $\bar{V}$ in expression (4.1) is assumed to be only partly relevant to the dependent attitude Y. From this figure we may observe that the component of the change message vector which is expressed along the $\vec{Y}$ vector is given by

$$\vec{Y} = \bar{V}\frac{m_v N_v}{m_x N_x + m_v N_v + m_w N_w} \cos\alpha_{vy}$$

As Figure A1 indicates, in the special case where $\alpha = 0°$ or $180°$, then the cosine of the angle α equals ± 1, and all of the potential in the change message will be expressed along $\vec{Y}$. Taking the relevancies (i.e., $\cos\alpha$) of the information from various sources into consideration, expression (4.1) yields

$$(4.2)\quad Y = \bar{X}\left[\frac{m_x N_x}{m_x N_x + m_v N_v + m_w N_w} \cos\alpha_{xy}{}^{*}\right] + \bar{V}\left[\frac{m_v N_v}{m_x N_x + m_v N_v + m_w N_w} \cos\alpha_{vy}\right]$$

$$+ \bar{W}\left[\frac{m_w N_w}{m_x N_x + m_v N_v + m_w N_w} \cos\alpha_{wy}\right]$$

The terms within the brackets [] are equivalent to the partial slopes of the respective independent variables on the dependent attitude. That is, in the multiple regression equation $Y = b_{xy}X + b_{vy}V + b_{wy}X$, the following terms are equivalent:

$$b_{vy} = \frac{m_v N_v}{m_x N_x + m_v N_v + m_w N_w} \cos\alpha_{vy}$$

$$b_{wy} = \frac{m_w N_w}{m_x N_x + m_v N_v + m_w N_w} \cos\alpha_{wy}$$

etc.

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*$\cos\alpha_{xy}$ has been added for generality. When the first term represents an error-free measure of the old attitude, α will of course be zero, and $\cos\alpha = 1$.

We may now assess the relative net effectiveness of any two messages by taking the ratio of the respective partial slopes. For example:

$$(5.1)\quad \frac{b_{vy}}{b_{wy}} = \frac{\frac{m_v N_v}{m_x N_x + m_v N_v + m_w N_w}\cos\alpha_{vy}}{\frac{m_w N_w}{m_x N_x + m_v N_v + m_w N_w}\cos\alpha_{wy}} = \frac{m_v N_v \cos\alpha_{vy}}{m_w N_w \cos\alpha_{wy}}$$

The cosines of the angles α between any two vectors are given by the correlation between the two measures involved (Van de Geer, 1971, p. 22). Accordingly, the cosines of the angles in (5.1) ($\cos\alpha_{vy}$ and $\cos\alpha_{wy}$) are given by the partial correlations $r_{vy.xw}$, and $r_{wy.xv}$. Thus, expression (5.1) may be reexpressed as

$$(6)\quad \frac{b_{vy}}{b_{wy}} = \frac{m_v N_v \, r_{vy.xw}}{m_w N_w \, r_{wy.xv}}$$

If the number of messages from each source is known or held constant, these terms may be rearranged to obtain:

$$(7) \qquad \frac{m_w}{m_v} = \frac{b_{wy}\, r_{vy \cdot xw}}{b_{vy}\, r_{wy \cdot xv}}$$

Expression (7) shows that, when the amount of information is controlled for in the data collection procedures, the estimation of the masses of unit messages from various sources can be accomplished without difficulty, despite the fact that they may not be entirely relevant to the dependent attitude.

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*At this stage we may be reminded that a partial slope is defined as $b_{xy} = \frac{\sigma_y}{\sigma_x} r_{ij.(k...n)}$. Accordingly, expression (7) could also be expressed as:

$$\frac{m_v}{m_w} = \frac{\sigma_x}{\sigma_v}$$

APPENDIX B

FACULTY QUESTIONNAIRE

APPENDIX B

FACULTY QUESTIONNAIRE

1. How many courses (graduate & undergraduate) have you taught in 1974 (Winter, Spring, Summer, and Fall)?

   _____(If you have not taught any courses in 1974, please return questionnaire unanswered!)

2. Of all the courses that you have been teaching in 1974, what percentage of courses have you taught on each of the following levels?

   Freshman/Sophomore _____%
   Junior/Senior _____%
   Graduate _____%

3. What is your primary field of teaching?

   _____

4. What is the average size of undergraduate classes you teach?

   _____ students

5. Indicate the percentage of your professional time that you have spent on teaching-related activities in 1974.

   _____ %

6. How many year of teaching experience do you have?

   _____ years

7. How many years have you been a faculty member at MSU?

   _____ years

8. Sex:

   _____M _____F

9. Age:

   _____ years

10. In what field did you receive your highest academic degree?

Field: Degree:

_____ _____

11. How many courses have you ever attended as a student in the field of education?

_____Zero

_____1-5

_____6-10

_____11-15

_____More than 15

12. Please distribute 100 points among the following two tasks in accordance with your preference for each task:

_____Teaching

_____Other (Service, Research, Administration)

100 TOTAL

13. How many faculty members from your department can you think of that you would readily like to work with

on teaching_____?

on research_____?

on administration_____?

Please react to each of the following statements by indicating the degree to which you agree or disagree with each. (Please circle appropriate number to the right of each item.)

		Completely Agree 6	5	4	3	2	1	Completely Disagree 0
14.	As an instructor I generally prefer tightly organized courses with clear goals and a high amount of predictability.	6	5	4	3	2	1	0
15.	In general, I would characterize my teaching attitude as task oriented; my primary concern is with the outcomes or products of my teaching.	6	5	4	3	2	1	0
16.	Teaching is primarily an art.	6	5	4	3	2	1	0
17.	Teaching is primarily a science.	6	5	4	3	2	1	0
18.	Available knowledge of the teaching-learning process is sufficiently advanced to provide a legitimate basis for a "science of teaching."	6	5	4	3	2	1	0
19.	In the long haul, academically 'good' students will learn under almost any instructional system, whereas 'poor' students will have difficulties no matter what instructional procedures are employed. It is the student, not the instructional model, that makes the real difference in learning.	6	5	4	3	2	1	0
20.	Decisions regarding teaching procedures to be employed in my classes (e.g. selection of content, mode of presentation, form of student grading, etc.) are made by me alone. My department, college, etc. does not interfere with my decisions at all.	6	5	4	3	2	1	0
21.	In my department I am considered an expert in instructional matters.	6	5	4	3	2	1	0

		Completely Agree						Completely Disagree
		6	5	4	3	2	1	0
22.	In general, I am very eager to try out innovative approaches to teaching.	6	5	4	3	2	1	0
23.	I put in much time and energy on instructional innovations.	6	5	4	3	2	1	0
24.	In general, I am very receptive to new ideas.	6	5	4	3	2	1	0
25.	In general, I am very willing to listen to the problems of others.	6	5	4	3	2	1	0
26.	By and large, college faculty should be held accountable for the outcomes (i.e. students' learning) that result from their teaching activities.	6	5	4	3	2	1	0
27.	I consider myself a behaviorist.	6	5	4	3	2	1	0
28.	I consider myself a humanist.	6	5	4	3	2	1	0
29.	Institutions of higher education should increasingly pursue an open door policy (i.e. provide universal access to higher education).	6	5	4	3	2	1	0
30.	The decision-making process within my department is completely autocratic.	6	5	4	3	2	1	0
31.	My department can be described as highly innovative in teaching its students.	6	5	4	3	2	1	0
32.	My department chairman can be characterized as highly supportive of instructional innovations.	6	5	4	3	2	1	0
33.	In general, my department may be characterized as exhibiting eagerness to seek out new ideas.	6	5	4	3	2	1	0
34.	In general, my fellow faculty members in my department are very willing to listen to the problems of others.	6	5	4	3	2	1	0

	Completely Agree 6	5	4	3	2	1	Completely Disagree 0
35. My colleague <u>friends</u> (persons among my colleagues whom I consider personal friends) are mainly interested in teaching (as opposed to research, administration, or service).	6	5	4	3	2	1	0
36. In terms of instructional methods used, my colleague <u>friends</u> may be characterized as very innovative.	6	5	4	3	2	1	0
37. My colleague <u>friends</u> are very much concerned about using instructional methods which they think are maximally effective in facilitating student learning.	6	5	4	3	2	1	0
38. In general, my colleague <u>friends</u> may be considered behaviorists.	6	5	4	3	2	1	0
39. In general, my colleague <u>friends</u> feel that institutions of higher education ought to be increasingly innovative in their attempts to meet present and future demands on higher education.	6	5	4	3	2	1	0

In recent years, some educators have urged faculty members to adopt a controversial instructional model that is claimed to assist instructors to find efficient and effective solutions to their instructional problems. This instructional model is sometimes referred to as "the systems approach to instruction," or, as it will be called here, "the competency based approach to instruction."

Since some of the remaining items will deal with this particular approach to instruction, you may want to <u>skim</u> over the "Description of the Competency Based Approach to Instruction" on the last page of this questionnaire.

The purpose of the following eight items (items # 40 to 47) is twofold. First, they summarize the Competency Based Approach to Instruction by listing the major activities (or 'steps') that the user of this approach goes through. Second, they attempt to assess the degree to which your own teaching behavior is guided by this approach. As you read through this summary, please circle the number to the right of each item which best describes <u>THE DEGREE to which you YOURSELF have actually engaged in the described activities</u> in 1974.

	Completely reflects my behavior						Does not reflect my behavior at all
	6	5	4	3	2	1	0
FIRST STEP: Specification of Goals in Terms of Student Competencies							
40. In the process of preparing for a course, general statements of desired student competencies are translated into specific competency or "performance" objectives which explicitly spell out a)what a student who has mastered the competency will be able to do; b)under what conditions he will be able to do it; and c)what criteria or standards will be used to determine whether the objective was met.	6	5	4	3	2	1	0
SECOND STEP: Synthesis of Instructional Unit							
41. Each desired student competency is matched with the appropriate learning condition (content and teaching strategies used for instruction) that will lead to the attainment of the competency. Or, stated differently, the content, content organization, media used for content presentation, and planned student activities are selected solely on the basis of how well they would facilitate the desired learning.	6	5	4	3	2	1	0
42. The matching of learning conditions with student competencies is done primarily on the basis of rigorous application of learning principles and other organized knowledge relevant to the teaching-learning process (e.g. psychology, communication, sociology, management, etc.).	6	5	4	3	2	1	0

	Completely reflects my behavior						Does not reflect my behavior at all
	6	5	4	3	2	1	0
THIRD STEP: Pre-Test							
43. Before actually teaching the course, each student is pre-tested in order a)to identify students lacking essential prerequisites, b)to identify students who already master the competencies to be taught in the course, and c)to determine at what point in the course a student should enter.	6	5	4	3	2	1	0
FOURTH STEP: Implementation of Instructional Unit With Continuous Data Collection							
44. Throughout the course of instruction, frequent student evaluations are used a)to provide students with corrective or confirming feedback; b)if necessary, to provide students with alternative learning routes to attain mastery levels; and c)to continuously evaluate the effectiveness of the learning conditions used.	6	5	4	3	2	1	0
FIFTH STEP: Post-Test							
45. After each course of instruction, students are administered a post-test. By comparing each student's performance against pre-specified performance standards the instructor can a)identify students who have attained mastery performance levels, and b)determine the exact areas of difficulties of each student who did not attain mastery levels.	6	5	4	3	2	1	0

	Completely reflects my behavior						Does not reflect my behavior at all
	6	5	4	3	2	1	0
SIXTH STEP: Revision/Re-cycling							
46. On the basis of data that evaluate the effectiveness of content and strategies used during instruction (data that were systematically collected both during and after instruction) revisions are made for subsequent courses. Revisions may have to be made both in the specification of desired student competencies and in the content and teaching strategies used for instruction.	6	5	4	3	2	1	0
47. This entire cycle of a)definition of goals, b)development and implementation of instructional unit, c)evaluation of instructional unit, and 4)revision is repeated until it will eventually result in a tried and tested combination of related teaching materials and teaching strategies that consistently achieve mastery of desired student competencies.	6	5	4	3	2	1	0

Please react to each of the following statements by indicating the degree to which you agree with each and/or the degree to which each statement describes your situation.

	Completely Agree						Completely Disagree
	6	5	4	3	2	1	0
48. In 1974, my teaching approach has been in total agreement with the philosophy and operational guidelines put forth by the Competency Based Approach to Instruction.	6	5	4	3	2	1	0
49. I feel that the Competency Based Approach to Instruction in harmful to students.	6	5	4	3	2	1	0

		Completely Agree						Completely Disagree
		6	5	4	3	2	1	0
50.	I feel that the Competency Based Approach to Instruction is superior to the traditional, non-competency based approach.	6	5	4	3	2	1	0
51.	Considering the type of content covered in my classes and the level at which it is taught, I feel that the Competency Based Approach to Instruction should be considered inappropriate.	6	5	4	3	2	1	0
52.	I feel that the benefits to be gained from the Competency Based Approach to Instruction readily justify the time and effort that its initiation and maintenance requires.	6	5	4	3	2	1	0
53.	I feel that the Competency Based Approach to Instruction would result in a rigid, 'mechanical' instructional setting that is not compatible with what I consider good, effective teaching.	6	5	4	3	2	1	0
54.	The climate in my department may be described as completely unreceptive to the Competency Based Approach to Instruction.	6	5	4	3	2	1	0
55.	If I had more time and other needed resources available to me, I would use the Competency Based Approach to Instruction to a greater extent.	6	5	4	3	2	1	0
56.	Institutions of higher education should be increasingly innovative in their attempts to meet present and future demands on higher education.	6	5	4	3	2	1	0
57.	The traditional, non-competency based approach to instruction in higher education is entirely adequate to meet educational objectives.	6	5	4	3	2	1	0

	Completely Agree 6	5	4	3	2	1	Completely Disagree 0
58. In general, my colleague friends perceive the Competency Based Approach to be extremely beneficial to students.	6	5	4	3	2	1	0
59. In general, my colleague friends are of the opinion that the Competency Based Approach readily justifies the time and effort its initiation and maintenance requires.	6	5	4	3	2	1	0

60. To what extent do you consider yourself a user of the Competency Based Approach to Instruction? (Please place a check-mark on any one of the ten levels below that is appropriate!)

10_____To a very high extent
9_____
8_____
7_____
6_____
5_____
4_____
3_____
2_____
1_____
0_____Not at all/To a very limited extent

61. Considering all the undergraduate and/or graduate course offered by your department, how many may be characterized as being at least partially competency based?

_____None
_____Few
_____Some
_____Many
_____All or nearly all

62. Of those courses that are competency based, to what degree are they competency based?

_____None of our courses is competency based.
_____To a very limited degree
_____To some degree
_____To a high degree
_____To a very high degree

63. Thinking back of your own college years, how many of the courses that you attended as a student may be characterized as having been at least partially competency based?

_____None
_____Few
_____Some
_____Many
_____All or nearly all

64. Of those courses that were competency based, to what degree were they competency based?

_____None of my college courses was competency based.
_____To a very limited degree
_____To some degree
_____To a high degree
_____To a very high degree

65. How many of your colleague friends (persons among your colleagues whom you consider personal friends) are using an approach to their instruction that may be characterized as at least partially competency based?

_____None
_____Few
_____Some
_____Many
_____All or nearly all

66. Of those friends who do use a competency based approach to their instruction, to what degree are they using it?

_____None of my friends is using a competency based approach.
_____To a very limited degree
_____To some degree
_____To a high degree
_____To a very high degree

Below, I would like to find out how much of your professional time is spent on certain communication activities. Please indicate the number of working hours per week that you spend interacting with each of the following ten agents. (NOTE: You may also use fractions of hours.)

I. INTERPERSONAL CONTACTS

On the average, how many hours per week of your professional time do you spend interacting with . . .

(67) 1. .....FRIENDS (persons among your colleagues whom you consider personal friends) ___Hrs. per week

(Please exclude personal friends from remaining interpersonal contacts!)

(68) 2. .....other FACULTY MEMBERS (professional interpersonal contacts with fellow faculty members from within and outside your department) ___Hrs. per week

(69) 3. .....ADMINISTRATORS (interpersonal contacts with administrators from within and outside your department) ___Hrs. per week

(70) 4. .....EDUCATIONAL CONSULTANTS. . . . . ___Hrs. per week

(71) 5. .....STAFF/ASSISTANTS (teaching assistants, graduate assistants, administrative staff) ___Hrs. per week

(72) 6. .....STUDENTS (time spent with students both in-class and out-of-class but excluding time spent with student assistants) ___Hrs. per week

II. MEETINGS

On the average, how many hours per week do you spend in. . .

(73) 7. .....DEPARTMENTAL FACULTY MEETINGS. . . . . ___Hrs. per week

(74) 8. .....OTHER BRIEF MEETINGS (Professional organization meetings, annual conferences, institutes, speeches, symposia, lectures, workshops) ___Hrs. per week

)75) 9. .....EXTENDED MEETINGS (College-level courses that you attend, summer and academic year institutes, seminars) ___Hrs. per week

III. READINGS

(76)10. .....Time spent reading PROFESSIONAL BOOKS, JOURNALS, PAPERS, etc. ___Hrs. per week

Please respond to the following ten items by indicating the percentage of each interaction with your professional information sources that may be characterized as dealing with matters related to teaching methods:

77. ____% of my professional interaction with FRIENDS (persons among my colleagues whom I consider personal friends) deals with matters related to teaching methods.

78. ____% of my interaction with other FACULTY MEMBERS deals with matters related to teaching methods.

79. ____% of my interaction with ADMINISTRATORS deals with matters related to teaching methods.

80. ____% of my interaction with EDUCATIONAL CONSULTANTS deals with matters related to teaching methods.

81. ____% of my interaction with my STAFF/ASSISTANTS (teaching assistants, graduate assistants, administrative staff) deals with matters related to teaching methods.

82. ____% of my interaction with STUDENTS (both in-class and out-of-class) deals with matters related to teaching methods.

83. ____% of DEPARTMENTAL FACULTY MEETINGS deals with matters related to teaching methods.

84. ____% of OTHER BRIEF MEETINGS (e.g. professional organization meetings, annual conferences, institutes, speeches, symposia, lectures, workshops) deals with matters related to teaching methods.

85. ____% of EXTENDED MEETINGS that I attend (college-level courses, summer and academic year institutes, seminars) deals with matters related to teaching methods.

86. ____% of PROFESSIONAL READINGS (books, journals, papers, etc.) that I am reading deals with matters related to teaching methods.

Below, please indicate the degree to which each of your professional sources of information is in favor of or opposed to the Competency Based Approach to Instruction.

		Opinion About Competency Based Approach						
		Highly in favor	In favor	Somewhat in favor	Neither for nor against	Somewhat opposed	Opposed	Highly opposed
		6	5	4	3	2	1	0
87.	The opinions of my colleague FRIENDS (persons among my colleagues whom I consider personal friends) may be characterized as	6	5	4	3	2	1	0
88.	The opinions of OTHER FACULTY MEMBERS with whom I come in professional contact may be characterized as	6	5	4	3	2	1	0
89.	The opinions of ADMINISTRATORS with whom I come in professional contact may be characterized as	6	5	4	3	2	1	0
90.	The opinions of EDUCATIONAL CONSULTANTS with whom I come in professional contact may be characterized as	6	5	4	3	2	1	0
91.	The opinions of my STAFF/ASSISTANTS may be characterized as	6	5	4	3	2	1	0
92.	The opinions of STUDENTS with whom I interact may be characterized as	6	5	4	3	2	1	0
93.	In DEPARTMENTAL FACULTY MEETINGS, references related to teaching methods may be characterized as	6	5	4	3	2	1	0
94.	References made to teaching methods in OTHER BRIEF MEETINGS that I attend (professional meetings, conferences, speeches, symposia, etc.) may be characterized as	6	5	4	3	2	1	0

	Opinion About Competency Based Approach						
	Highly in favor	In favor	Somewhat in favor	Neither for nor against	Somewhat opposed	Opposed	Highly opposed
	6	5	4	3	2	1	0
95. References made to teaching methods in EXTENDED MEETINGS that I attend (college-level courses, seminars, etc.) may be characterized as	6	5	4	3	2	1	0
96. With respect to the Competency Based Approach to Instruction, most of the PROFESSIONAL BOOKS, JOURNALS, PAPERS, ETC. that I read may be characterized as	6	5	4	3	2	1	0

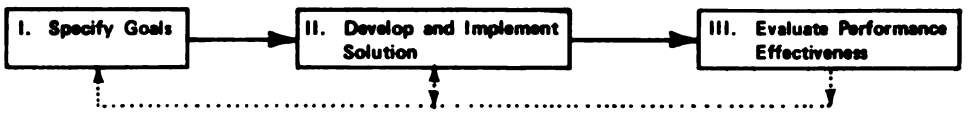
DESCRIPTION OF THE COMPETENCY BASED APPROACH TO INSTRUCTION

The Competency Based Approach to Instruction is defined as a systems oriented problem solving approach that 1) defines the goals of instruction exclusively in terms of desired student competencies; 2) is technological; and 3) is criterion-referenced.

The Competency Based Approach to Instruction conceives of education as a system. A system is "the sum total of separate parts (or components) working independently and in interaction to achieve previously specified objectives." Some of the components of the educational system could be: content presented to students, teaching strategies, management, facilities, and learners.

The competency based approach maintains that to solve problems relating to such an educational system, a system approach would be an effective and efficient tool to assure that the complex interactions will be properly considered.

Below is a general representation of the system approach, followed by a short explanation of how the Competency Based Approach to Instruction makes use of it:



To I. SPECIFICATION OF GOALS: The Competency Based Approach defines the goals of instruction in terms of desired student competencies

The Competency Based Approach to Instruction implies a view of the educational process in which "education" means changing behavior of a student so that he is able, when encountering a particular problem or situation, to display a behavior which he did not previously exhibit. This view forces the instructor to specify the goals of the instructional system in terms of STUDENT COMPETENCIES that the learner is expected to master as a result of instruction. Competencies are specific statements which spell out a) what the student will be able to do as a result of instruction, and b) what specific performance standards can be applied to determine whether the student has successfully met the objective.

Competencies are usually spelled out at several levels of specificity. At the most abstract level, desired student competencies are quite general statements most helpful for the determination of general goals toward which several years of education might be aimed. At a second and more concrete level, desired student competencies are stated more specifically and are useful in specifying the goals of an instructional unit, a course, or a sequence of a course. Finally, on the operational level, desired student competencies are translated into performance or "behavioral objectives" which are statements of overt expectations the instructor has for students as a function of instruction. A performance objective states a) what a student who has mastered the objective will be able to do and under what conditions he will be able to do it; and b) the criterion or standard used for evaluation.

To II. DEVELOPMENT OF INSTRUCTIONAL UNIT: The Competency Based Approach does it on a technological basis

The competency based model is based on the view that each desired student competency can be matched with an 'appropriate' learning condition (or learning environment) that brings about the desired student learning. Learning conditions consist of such components as content presented, content organization, media used for content presentation, and the manner in which the student makes use of the content.

The competency based model is technological in that it suggests that for each student competency an appropriate learning condition can be identified through the rigorous application of organized knowledge. Relevant organized knowledge may come from a great variety of sciences, such as learning psychology, sociology, management, communication, etc. Consequently, the competency based approach conceives of the instructor as a technologist who is applying organized knowledge to the selection and organization of learning conditions which will result in the desired student learning.

To III. EVALUATION OF INSTRUCTIONAL UNIT: The Competency Based Approach uses criterion-referenced measures only

Since the goals of the instructional system are spelled out strictly in terms of desired student competencies, the only form of student evaluation is criterion-referenced. That is, each student's performance after instruction is evaluated against the pre-specified standards (NOTE: The student's performance is not compared to the performances of other students). If the student has successfully met the objective, he has attained "mastery" and hence is allowed to proceed. If he has not reached mastery levels, remedial instruction will result.

Both during and after instruction, data is collected to evaluate the effectiveness of learning conditions that are being used for instruction. On the basis of such data, the course is revised such that the learning conditions in subsequent courses are more effective in bringing about the desired learning. Revisions can be made both in the specification of desired student competencies as well as in the learning conditions (content and strategies).

This cycle of I) Specification of objectives; II) Development of instructional unit; and III) Evaluation, will be repeated until the instructional unit (means) is systematically related to the objectives (ends).

APPENDIX C

LETTER ACCOMPANYING FACULTY QUESTIONNAIRE

APPENDIX C

LETTER ACCOMPANYING FACULTY QUESTIONNAIRE

November 20, 1974

In order to assist MSU faculty members with some of their instructional problems, we in Instructional Development and Technology depend a great deal on research in teaching and learning. As a graduate student in this field, I am studying the influence of various individual and organizational factors on the adoption of a set of instructional methods by MSU faculty members. This study has been endorsed by my doctoral committee and approved through the Office of Institutional Research at MSU. The results will serve as the foundation for my Ph.D. dissertation in Instructional Development and Technology.

I need your help to successfully complete the present phase of this diffusion study. Therefore, I am taking the liberty of asking you for 15-25 minutes of your time to complete the enclosed questionnaire. Please notice that each item may be answered by either a word, a number, or a check-mark. Should you have any questions regarding some of the items or the study itself, please give me a call at 353-9656.

Since the value of this study depends upon the frankness and care with which you respond, complete anonymity (no coding of any kind) will be observed throughout the study. Your identity will be unknown, even to myself, and neither individual faculty nor their departments will be identified in the published results. These extreme efforts are made to encourage your response and thereby increase the value of the study.

Your completing and returning the instrument in the enclosed campus mail envelope by Wednesday, November 27, 1974, will be greatly appreciated. Also, attached you will find a signature card to be forwarded separately to indicate your participation in the study and guide in subsequent procedures where required.

Thank you for your consideration and cooperation in this important matter.

Yours truly,

Fritz Kramer
Graduate Research Assistant
Office of Medical Education, Research and Development
A211 East Fee Hall
Michigan State University

APPENDIX D

FOLLOW-UP LETTER

APPENDIX D

FOLLOW-UP LETTER

December 4, 1974

Some two weeks ago you received a request for your participation in a research project focusing on the influence of various individual and organizational factors on the adoption of a set of instructional methods by MSU faculty members. The questionnaire that you received was sent to a representative set of faculty members in the institution, and the response of each faculty member is crucial to the success of this study.

My review of the signature cards indicates that you have not yet forwarded a copy of the questionnaire. If you have completed and returned the questionnaire, please disregard this letter. Simply sign and return the attached signature card. This card is my only record of your participation.

In view of the importance of your participation, your cooperation is again requested. Please complete the questionnaire and forward it and the signature card as soon as possible. Should you need an additional copy of the questionnaire, please contact me at 353-9658.

I appreciate the time required of you in this effort. Should you be interested, I would be happy to share the results of this study with you once the remaining questionnaires have been received.

Thank you,

Fritz Kramer
Graduate Research Assistant
Office of Medical Education, Research and Development
A-211 East Fee Hall
Michigan State University

Enclosure

APPENDIX E

SECOND FOLLOW-UP LETTER

APPENDIX E

SECOND FOLLOW-UP LETTER

January 6, 1975

On November 21 and again on December 5, a request was mailed to you asking for your participation in a university-wide research project. This study concentrates on the influence of selected individual and organizational factors on the adoption of a set of instructional methods by MSU faculty members.

A review of the signature cards indicates that you have not yet forwarded a copy of the questionnaire. I realize that constraints on your time during the end of Fall term might have prevented you from completing it. Hopefully, you may have more time at the beginning of a new quarter, and will be able to complete the enclosed copy. Please be assured again that the opinions of individual respondents and their departmental and college affiliation will remain completely anonymous throughout the study.

Since your participation is crucial to the success of the study, I would be very grateful if you would take some time to fill out one copy of the questionnaire and return it to me in the enclosed campus mail envelope by Wednesday, January 16, 1975. This deadline is necessary if the responses are to be analyzed and a report submitted by the end of this Winter term.

Thank you for your consideration and cooperation in this matter.

Yours truly,

Fritz Kramer
Graduate Research Assistant
Office of Medical Education, Research and Development
A-211 East Fee Hall
Michigan State University

P.S. If you have completed and returned the questionnaire, simply sign and return and attached signature card. This card is my only record of your participation.

Enclosures

APPENDIX F

ZERO-ORDER CORRELATION MATRIX

APPENDIX F

ZERO-ORDER CORRELATION MATRIX

CORRELATION COEFFICIENTS.

A VALUE OF 99.0000 IS PRINTED
IF A COEFFICIENT CANNOT BE COMPUTED.

	X01	X02	X03	X04	X05	X06	X07	X08
X02	.79426							
X03	.23911	.33774						
X04	.23134	.22112	.20772					
X05	.24731	.24922	.21[illegible]	.33[illegible]2				
X06	.25957	.24[illegible]	.22[illegible]91	.13[illegible]	.62686			
X07	.13903	.[illegible]700	.44[illegible]41	.11[illegible]	.24[illegible]51	.17447		
X08	.23[illegible]	.[illegible]0[illegible]	.42[illegible]33	.23[illegible]	.34[illegible]	.[illegible]0[illegible]	.23997	
X09	.26[illegible]	.[illegible]521	.26[illegible]0	.23[illegible]	.24[illegible]6	.[illegible]238	.19524	.11994

	X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12
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X32	-.[illegible]2762	-.[illegible]2[illegible]	-.[illegible]2[illegible]	-.[illegible]2[illegible]	-.[illegible]1[illegible]	-.[illegible]2[illegible]	-.[illegible]2677	-.[illegible]0[illegible]	-.[illegible]9[illegible]	-.27735	-.08825	-.33558
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X34	-.45[illegible]	-.[illegible]6[illegible]	-.35[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]2[illegible]	-.[illegible]4[illegible]	-.[illegible]9[illegible]	-.[illegible]1[illegible]	-.[illegible]9[illegible]	-.34[illegible]
X35	-.47[illegible]	-.[illegible]6[illegible]	-.[illegible]5[illegible]	-.[illegible]2[illegible]	-.[illegible]1[illegible]	-.[illegible]2[illegible]	-.[illegible]3[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.31[illegible]	-.12594	-.37591
X36	-.[illegible]3123	-.[illegible]5[illegible]	-.[illegible]5[illegible]	-.22[illegible]	-.[illegible]2[illegible]	-.[illegible]1[illegible]	-.[illegible]2[illegible]	-.[illegible]4[illegible]	-.[illegible]5[illegible]	-.36309	-.[illegible]1[illegible]	-.44[illegible]
X37	.36[illegible]	.[illegible]4[illegible]	.[illegible]4[illegible]	.[illegible]2[illegible]	.[illegible]2[illegible]	.[illegible]1[illegible]	.[illegible]2[illegible]	.[illegible]4[illegible]	.[illegible]4[illegible]	.29[illegible]	.09899	.36[illegible]
X38	-.[illegible]6[illegible]	-.[illegible]2[illegible]	-.[illegible]1[illegible]	.[illegible]0[illegible]	.[illegible]4[illegible]	-.[illegible]1[illegible]	-.[illegible]3[illegible]	-.[illegible]7[illegible]	-.[illegible]6[illegible]	-.[illegible]5[illegible]	-.[illegible]2[illegible]	-.[illegible]1[illegible]
X39	.15[illegible]	.[illegible]2[illegible]	.[illegible]2[illegible]	.[illegible]2[illegible]	.[illegible]2[illegible]	.[illegible]2[illegible]	.[illegible]2[illegible]	.[illegible]2[illegible]	.[illegible]3[illegible]	-.[illegible]2[illegible]	-.[illegible]1[illegible]	-.[illegible]2[illegible]
X40	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]0[illegible]	-.[illegible]0[illegible]
X41	-.[illegible]0764	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]0[illegible]	-.[illegible]1[illegible]	-.[illegible]2[illegible]	-.[illegible]6[illegible]	-.[illegible]6[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]1[illegible]	-.[illegible]2[illegible]
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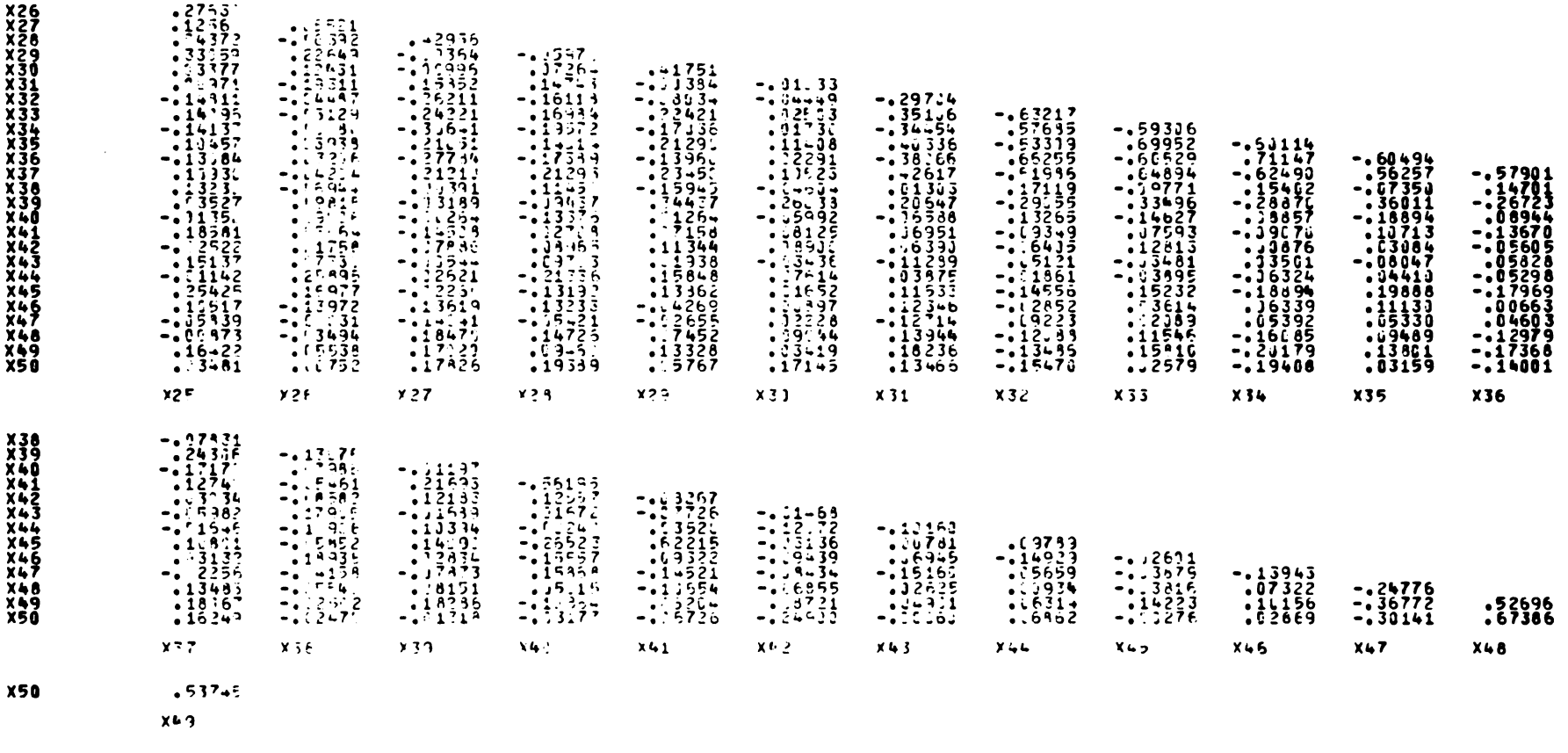
X49	.22[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]
X50	.2[illegible]3	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]	.[illegible]1[illegible]

	X01	X02	X03	X04	X05	X06	X07	X08	X09	X10	X11	X12



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