Cognition as a variable of teachers responsiveness to innovation
by Joanne Lucille Erickson

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University
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Abstract:
The problem of this study was to determine if, in the initial stages of a planned change, teachers' receptivity to innovation could be predicted from knowledge of cognitive functioning as measured by conceptual complexity and the attribute variables of gender, years of teaching experience, age of the teacher, level of the teacher's preparation, and grade level taught.

The problem was investigated by: (a) a review of the literature related to cognitive development theories and developmental concerns of teachers, (b) an investigation of the cognition and receptiveness to change of 143 teachers and the collection of data related to selected attribute variables, and (c) the tabulation, analysis, and comparison of the data collected.

The hypotheses tested in this study were concerned with the relationship between cognition as measured by conceptual level, and receptivity to change as measured by the Stages of Concern Questionnaire and selected variables of gender, years of teaching experience, age, level of preparation, and grade level taught. The hypotheses were tested with multiple regression analysis, a one-way analysis of variance, a chi-square test of independence, and Pearson-r at the .05 level of significance.

The major findings of the study were: (a) no relationship could be determined between teachers' receptiveness to change during the adoption stage of an innovation and cognitive complexity, (b) teachers' receptivity to change could not be predicted from the knowledge of cognitive complexity, and (c) individual teacher characteristics of years of teaching experience, grade taught, age, gender, and level of preparation could not be related to receptivity to change or to cognitive complexity.

The major recommendations of the study were: (a) to conduct longitudinal studies to determine whether cognition is a factor in teacher receptivity to change in later stages of the change process, i.e., implementation and institutionalization; (b) to continue research in the area of teachers as adult learners and the developmental process of their cognitive growth in order to formulate an adequate theory of instruction that may be applied to staff development; and (c) to continue research with teachers who show high receptivity to change to identify common variables so that a better understanding of the change process is developed and needed planned change more successfully implemented.

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of

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APPROVAL

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Joanne Lucille Erickson

This thesis has been read by each member of the graduate committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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ABSTRACT

The problem of this study was to determine if, in the initial stages of a planned change, teachers' receptivity to innovation could be predicted from knowledge of cognitive functioning as measured by conceptual complexity and the attribute variables of gender, years of teaching experience, age of the teacher, level of the teacher's preparation, and grade level taught.

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The major findings of the study were: (a) no relationship could be determined between teachers' receptiveness to change during the adoption stage of an innovation and cognitive complexity, (b) teachers' receptivity to change could not be predicted from the knowledge of cognitive complexity, and (c) individual teacher characteristics of years of teaching experience, grade taught, age, gender, and level of preparation could not be related to receptivity to change or to cognitive complexity.

The major recommendations of the study were: (a) to conduct longitudinal studies to determine whether cognition is a factor in teacher receptivity to change in later stages of the change process, i.e., implementation and institutionalization; (b) to continue research in the area of teachers as adult learners and the developmental process of their cognitive growth in order to formulate an adequate theory of instruction that may be applied to staff development; and (c) to continue research with teachers who show high receptivity to change to identify common variables so that a better understanding of the change process is developed and needed planned change more successfully implemented.

CHAPTER 1

INTRODUCTION

Staff development for teachers has a long history and is a well established tradition of the profession. The high interest in staff development that currently exists among educators is being fueled by several major developments. The recognition that college training only provides entry-level skills and knowledge and is a mere introduction to the world of teaching has certainly led to a new emphasis on staff development. It is recognized that most newly graduated teachers are not yet fully developed professionals (Rubin, 1975). In the past, when there was a high degree of teacher turnover, it was possible to bring teachers into the school whose experience was consonant with the goals of the school and whose training needs were minimal. But, as Mann (1976) has pointed out, school faculties have become relatively stable; thus change has to be accomplished by working with the existing staff. Finally, and perhaps most significantly, attention is being focused on staff development because of the increased pressure for schools to change. Public attention has been focused on education with the publication of reports on the status of American education, such as *A Nation at Risk* (The National Commission on Excellence in Education, 1983). Today the call for educational reform comes from all fronts. Sergiovanni and Starratt (1983, p.

326) wrote: "Staff development in education has come of age. Its importance is undisputed."

Regardless of the delivery system or the content, staff development programs share a common purpose: to bring about change. "Three major outcomes of effective staff development programs are changes in: (1) teachers' beliefs and attitudes, (2) teachers' instructional practices, and (3) students' learning outcomes" (Guskey, 1985, p. 58).

Critics, however, suspect the effectiveness of staff development programs for changing teacher behavior. Studies, unfortunately, point to the conclusion that despite determination, effort, and money poured into staff development projects, they have not been very effective (Lieberman and Miller, 1979; Graham, 1983; Griffin, 1983; Huberman and Miles, 1984; Hord et al., 1987).

The problem of introducing change into educational systems has been a popular topic over the past 20 years. Staff development efforts have focused on attempting to change the attitudes and perceptions of teachers, believing that these changes would lead to changes in practice that would eventually lead to improved student learning. While most teachers generally want to do all they can to improve student learning, most oppose innovation that requires radical alterations in their instructional practices and procedures. "The likelihood of their implementing a new program or innovation depends largely on their judgment of the magnitude of the required change" (Guskey, 1985, p. 59).

Romberg and Price (1983) discussed how the effective implementation of an innovation may involve different levels of what they termed "restructuring." The simplest restructuring is the substitution of one isolated component of the system for another, such as changing a textbook. The most complex restructuring involves changes of behaviors and values. Romberg and Price (1983) devised a continuum of restructuring wherein innovation with the least restructuring is labeled "nominal innovation" and that with the most restructuring is labeled "radical innovation." The authors defined nominal innovation as that which does not challenge tradition and values and is perceived as designed to make ongoing practice more effective or somehow better. An example of nominal innovation cited in their work is the replacement of the slide rule with the calculator. At the other extreme, radical innovation is defined as that which challenges tradition and values. Modern math is used as an example of a radical innovation. Radical innovation involves a major system transformation and is typically ambitious in the amount of time, energy, and natural resources invested. Massive changes are expected because of the large-scale investment. Romberg and Price (1983, p. 159) stated that "Most change, however well intended, ends up being nominal with changes in labels, not practices."

The literature suggests that radical change in many respects appears as pilot projects with sustained change rarely resulting. Enthusiasm and dedication are eroded in a very short time, after which teachers revert to old habits and practices. "Programs or innovations that are dramatically different from current practice or that require teachers to make major revisions in the way they presently teach are unlikely to be implemented well, if at all" (Doyle and Ponder, 1977, p. 12).

At a time when economic conditions for education are becoming increasingly difficult, the inefficiency of our staff development failures cannot be tolerated. More importantly, when innovation begins, hopes are raised, enthusiasm engendered, and actions motivated. But if failure follows, there is disappointment, suspicion, disillusionment, and distrust. The questions that this and other current research are addressing is: How can we avoid the conditions that cause innovations to falter and fail? Can we change the dismal history of staff development efforts?

Numerous studies have been conducted to examine the process being used to change schools and to identify the variables of successful staff development programs. The National Institute of Education (NIE) recently funded the Research and Development Center for Teacher Education at the University of Texas at Austin to examine assumptions about change. Hord et al. (1987) presented the following conclusions of that group:

(1) Change is a process, not an event. Change occurs over time, usually a period of several years.

(2) Change is accomplished by individuals. Change affects people, and their role in the process is of utmost importance. Therefore, individuals must be the focus of attention in implementing a new program.

(3) Change is a highly personal experience. People do not behave collectively. Each individual reacts differently to change, and sufficient account of these differences must be taken. Some people will assimilate a new practice much

more rapidly than others; some will engage in the process more readily than others. Change will be most successful when its support is geared to the diagnosed needs of the individual users. Since change is highly personal, then clearly different responses and interventions will be required for different individuals. Paying attention to each individual's progress can enhance the improvement process.

(4) Change involves developmental growth.

(5) Change is best understood in operational terms. Teachers, and others, will naturally relate to change or improvement in terms of what it will mean to them or how it will affect their current classroom practice. Their concern is with the change in values, beliefs, and behaviors the change will require.

(6) The focus of facilitation should be on individuals, innovations, and the context.

The attention given by the team of researchers at the University of Texas to the importance of the individual in the change process and the importance of developmental growth lends importance to this research study.

In a summary of staff development in rural schools, the Northwest Regional Educational Laboratory cited studies by the Rural Education Advisory Committee and the National Rural Project, which also identified developmental growth as critical to successful staff development (O'Connell and Hagans, 1985).

Major studies on effective staff development programs continue to identify individual needs as a success variable. A study on staff development conducted in Florida concluded: "In-service education programs that have differentiated training experiences for different teachers (that is 'individualized') are more likely to accomplish their objectives than are programs that have common activities for all participants" (Edelfelt and Johnson, 1975).

In an attempt to improve the understanding of the process of change in educational institutions while at the same time maintaining sight of the individual, it seems appropriate to study the effects of developmental growth on the successful implementation of innovation.

The Theoretical Base

The Conceptual Systems Theory developed by Harvey, Hunt, and Schroder (1961), and later credited to Schroder, Driver, and Streufert (1967), provides the theoretical basis for this study. Schroder et al. (1961) theorized that individuals process information on a continuum from low complexity to high complexity or abstract thinking. This information processing ability is referred to as "conceptual complexity" and is defined as consisting of two interrelated components: (1) differentiation, i.e., the amount or number of attributes of information used by an individual in his or her thinking, and (2) integration, i.e., the number of concepts formed by the individual (Schroder, 1971). The ability to form a variety of concepts on the basis of a given array of information appears to be the most adaptive facet of human intelligence according to Schroder. He would maintain that conventional tests of intelligence and cognitive ability fail to measure this integrative component.

Schroder's Conceptual Systems Theory assumes that increasingly complex interpersonal environments activate and stimulate increasingly complex conceptual structures. However, if the environment is overly complex in relation to the individual's information-processing capacity, there is a tendency to reduce conceptual complexity and hence behavioral complexity. Thus, while each individual's behavior relates to the complexity of the environment in curvilinear fashion, the optimal environmental complexity for each individual varies according to his or her characteristic degree of conceptual structure (Schroder, 1971).

Equally important to the theoretical base of this study is the work of Frances Fuller during the mid- and late-1960's (Fuller, 1969). Fuller pursued a series of studies on the "concerns" of teachers. Based on these studies, Fuller proposed a developmental conceptualization of the concerns of teachers. She concluded that concerns occur in a natural sequence. This pioneering work on concerns of teachers served as the basis for a developmental model of supervision (popularized by Glickman, 1985) and for the Concerns-Based Adoption Model developed by Hord et al. (1987). The Concerns-Based Adoption Model consists of three primary components: (1) the Innovative Configuration, (2) the Stages of Concern Questionnaire, and (3) the Levels of Use.

The Innovative Configuration is a tool to determine an accurate picture of the range of operational patterns that result when teachers put innovations into operation in their classrooms, assuming that individual teachers use different parts of an innovation in different ways. The Stages of Concern Questionnaire is a diagnostic approach which identifies seven stages of concern experienced by teachers involved in the change process. Important to this component are the suggestions given to deliver interventions that will respond to each stage of concern. The Levels of Use provides the third component, which identifies the degree to which teachers are using the new practices and serves as an evaluation tool of the implementation process (Hord et al., 1987).

Fuller, Glickman, and Hord all worked at the Research and Development Center for Teachers at the University of Texas at Austin. Hord, Hall and others observed that teachers and professors involved in change appeared to express "concern" about innovation that was quite similar to those Fuller had identified in her developmental conceptualization of teachers. As in Fuller's work with teachers' concerns about teaching, and Glickman's theory of teacher maturity as a variable to be considered in supervision style, stages of concern a teacher has about an innovation appear to develop on a continuum from early unrelated, to self, to task, and finally to impact concerns (Hall et al., 1977). Concerns about innovations appear to be developmental in that earlier concerns must first be resolved before later concerns emerge.

Hall and his associates identified seven stages of development teachers appear to move through when they are involved in staff development and systematic change. They assert that these concerns change in what seems to be a logical progression as teachers become increasingly skilled in using a particular innovation. Other factors surely influence concerns as well. Other demands on the person may prohibit the innovation from having a high priority in the individual's life, the innovation may be essentially a bad one, or the knowledge and skill requirements may be beyond the person's capabilities. All of these factors would affect the sequential development of a teacher in his/her concerns about change. It is also worth investigation as to whether conceptual structures affect the normal linear developmental process. The behavioral properties of conceptual structures as theorized by Schroder et al. (1967) indicate that behaviors associated with more complex conceptual structures are required before effective adaptation to complex changing situations can occur.

Statement of the Problem

The problem of the study was to determine if, in the initial stages of a planned change, teachers' receptivity to innovation could be predicted from knowledge of cognitive functioning as measured by conceptual complexity and the following attribute variables: gender, years of teaching experience, age of the teacher, level of the teacher's preparation, and grade level taught.

Need for the Study

The annual Gallup Poll of the public's attitude toward education clearly indicates that the public has lost trust in public education. There has been finger pointing and fault finding in the numerous reports criticizing the status of education. There appears to be little argument that some schools, particularly in the public sector, are in serious difficulty. That difficulty has manifested itself as concern for quality education for all students (Adler, 1982); calls for clarification in the goals of education (Goodlad, 1984; Boyer, 1983); debates over appropriate instructional methods, tools, and materials (Adler, 1982; Boyer, 1983); recommendations on reorganizing the school structure (Goodlad, 1984; Sizer, 1984; Carnegie Council on Adolescent Development, 1989); and calls for new roles for staff (The National Commission on Excellence in Education, 1983; Goodlad, 1984). Griffin (1983, pp. 1-2) stated:

> The problematic nature of schools in our present cultural milieu appears not to be an arguable issue among thoughtful educators and sensitive observers. What is arguable, in some settings, is how to act upon the problems associated with the schools. . . . Staff development programs, it seems to some, hold the promise of creating a means of problem amelioration potentially more effective than many of the panaceas which have been and continue to be put forward.

Educators have both welcomed and cursed the attention given to education by various task forces, politicians, business, the press, and the public. This attention has served, however, to provide a catalyst for schools to examine their effectiveness in an attempt to improve practice and respond to the call for accountability. This examination of effectiveness has led to a recognition that if improvements are to be made, changes in practice and curriculum must be implemented. These changes will require teachers to adopt new innovations. Studies point to the conclusion that despite determination, effort, and money poured into staff development projects designed to effect change, if teachers are unwilling or unable to implement an innovation, it is doomed to failure. Unfortunately, failure to produce sustained change in teachers' behavior generally has been the dismal outcome of staff development projects designed to assist teachers in adopting innovations that are intended to grow into reforms.

Extensive research has been conducted on effective change and attempts have been made to identify the characteristics of successful staff development programs that have resulted in improved student achievement (Harris, 1980; Griffin, 1983; Sparks, 1983; Korinek et al., 1985). That research has focused on how to avoid the conditions that cause innovations to falter and fail.

The literature suggests that planned educational changes can be divided into three stages: adoption, implementation, and incorporation as a permanent feature of the system (Waugh and Punch, 1987). Over the past four or five decades, considerable research has been done relating to the adoption stage of planned change (Pressman and Wildavesky, 1973). Until the mid-70's, research on planned change seemed to concentrate on the adoption of innovations by individuals. From this research, conclusions and generalizations were drawn and models were proposed to explain why individuals do or do not adopt innovations (Rogers and Shoemaker, 1971). A large body of literature was developed regarding initial resistance to change, which led to studies and theories on ways of changing attitudes toward innovation. Research on individual characteristics became less popular, however, because individual characteristics were thought to be non-manipulable and the information gleaned through this line of research was considered to be of little practical use to managers of change. It also became increasingly apparent that while a change may be adopted, it may not be implemented as planned and not subsequently incorporated into a permanent feature of the system. Research attention from the mid-70's to mid-80's turned to the implementation and incorporation stages of planned change.

With the realization that the process of change was more complex than originally thought, recent research has again focused on teachers themselves and the attitudes and characteristics of teachers that may contribute significantly to the success or failure of change strategies. Focus on cognition and metacognition has generated new interest in individual characteristics of all learners, including teachers involved in the change process.

Rutherford (1986) reported that the Research and Development Center for Teacher Education at the University of Texas in Austin has for many years studied change in schools across the nation and attempted to determine individual characteristics that could be related to teachers' concerns about change. The Center's researchers have examined such variables as age, gender, years of teaching experience, years of preparation, number of years at a particular school, and secondary/elementary teaching level; they have concluded that none of these demographic variables were influential on teachers' concerns about and uses of an innovation. Rutherford (1986, p. 7) reported: "Never were we able to establish any kind of consistent relationship between these variables and outcome variables such as teachers' concerns about the particular change being implemented or their use of the innovation."

Intellectual traits and developmental maturity are two individual characteristics that have been found to relate to teacher behavior change and may have importance in understanding the change process (Sparks, 1983). In a review of the literature on adult development, Oja (1979) made a strong case that staff development will have little impact on teaching styles without explicitly addressing personal and cognitive developmental levels of teachers. Sparks (1983) stated that more attention is needed in the area of teacher characteristics as the accumulating evidence suggests that characteristics such as teachers' cognitive development may influence teachers' ability to profit from inservice training. In Showers' (1983) study of coaching, teachers' conceptual levels were investigated. Conceptual levels refer to modes of thinking and are theorized to range from concrete, rigid thought and behavior to abstract, more flexible thought and behavior (Hunt, 1975). Showers (1983) found that conceptual level was positively related to transfer of training among teachers; more flexible thinkers were more capable of using the recommended models of teaching as intended. Yarger's (1976) study of conceptual levels and teachers' learning styles concluded that a relationship indeed existed between the two variables. Other studies (Harvey, 1970; Murphy and Brown, 1970; Rathbone and Harootunian, 1971) have presented evidence to support the theory that a relationship does exist between conceptual level and teaching style.

In a monograph which synthesized the literature on adult development, Merriam (1984) concluded that as more and more becomes known about how adults grow and change as they age, more effective practices in educating adults can be implemented. She concluded that theories must be put into operation and tested and that "findings from one study have to be verified by subsequent research" (Merriam, 1984, p. 33). Krupp (1986) noted that a need exists for further research investigating innovative staff development ideas connecting school goals to personal needs and developmental growth of teachers. The term "staff development" itself suggests a growth orientation -- not something the school does to the teacher, but something the teacher does independently. Sergiovanni and Starratt (1983, p. 327) stated, "Staff development does not assume a deficiency in the teacher, but rather assumes a need for people at work to grow and develop on the job." Sprinthall-Thies and Sprinthall (1987, p. 65) noted, "There is substantial evidence to support the view that adults who process experience at higher and more complex levels of development perform more adequately in complex human helping roles."

There is, it seems, appropriate evidence to consider the cognitive functioning of teachers as an important variable in understanding planned change in the initial adoption phase. Teachers' ability to think abstractly may be an important component of change theory. "Ability to think abstractly" is defined as skill in perceiving numerous interrelationships among stimuli, viewing situations from varied perspectives, and processing complex information. To the extent that teachers have these skills, and perhaps to the extent that these skills can be acquired, and to the extent that they relate to teachers' ability to adopt innovation, they have implications for staff development programs that have as their purpose effecting educational change. The question to ask is simple: Can knowledge of cognitive functioning actually assist us in helping school staff to effect systemwide change? If the innovation is one that requires higher-order cognitive abilities such as understanding and applying abstract concepts, then indeed the level of cognitive development may be an important predictor (Sprinthall-Thies and Sprinthall, 1987).

General Questions to Be Answered

The general questions listed below were addressed in order to determine whether teachers' receptivity to innovation could be predicted from knowledge of level of cognitive complexity and selected attribute variables.

(1) Is there a relationship between teachers' receptivity to change during the adoption stage and their cognitive complexity?

(2) How accurately can receptivity to change during the adoption stage be predicted from the knowledge of teachers' cognitive complexity?

(3) Can the individual teacher characteristics of years of teaching experience, grade taught, age, gender, and level of preparation be related to receptivity to change or to cognitive complexity?

General Procedures

The population for the study included teachers in the Great Falls Public School District in Great Falls, Montana, who were involved in changing grade configurations from a K-6 elementary, 7-8 junior high, 9-12 senior high, to a K-5 elementary, 6-8 middle school, and 9-12 senior high. Participating teachers were those teachers who were actually involved in changing their teaching assignment to the middle school and thus were involved in a systemwide change process that required substantial change in practice and belief. While the change to middle schooling itself was not important to this study, a systemwide innovation that required substantial change in teacher practice and belief was in order to test the theories proposed. The total number of teachers involved in the study was 143.

The researcher coordinated the research activities with the curriculum coordinators of the district. Once the introduction of the innovation was completed, teachers participating in the study were assessed as to their receptivity regarding adoption of the innovation using the Stages of Concern Questionnaire (SoCQ) (see Appendix A) (Hall et al., 1977). This questionnaire is a 35-item Likert scale instrument on which respondents indicate their present degree of concern about the innovation. There are seven stages of concern ranging from 0 to 6. The questionnaire is psychometrically rigorous with established reliability and validity so as to provide meaningful research data. The SoCQ data can be interpreted in two ways: (1) by noting the stage that received the highest percentile score which indicates the kinds of concerns that are most intense for the subject, or (2) by examining a profile of scores with the highest and second highest scores indicating areas of greatest concern and the lower scores as areas of least concern (Hall et al., 1977). The SoCQ requires approximately 15 minutes to complete and can be administered in a group setting.

At this same time, the Paragraph Completion Test (PCT) (Hunt et al., 1978) (see Appendix B) was administered to participating teachers as a measure of cognitive complexity. The PCT is a semi-projective method to assess conceptual level (CL). Completion responses are considered to be thought samples which are scored according to how a person thinks. Scoring the PCT requires the rater's use of clinical judgment. The PCT is a five-question test which requires the subject to complete a sentence stem appearing at the top of each page of the test booklet and then to write at least three additional sentences in response to the item. The subject is given 130 seconds in which to complete the paragraph and when 20 seconds remain, he/she is asked to finish the sentence being worked on. The PCT is the most widely used measure of the integrative components of conceptual complexity and has consistently predicted complex behavior performance in experimental settings and correlates positively with theoretically related measures of personality and cognition. Inter-rater, split-half, and preliminary test-retest reliability coefficients are also satisfactory, making the test a psychometrically sound and valid measure of complexity (Gardiner and Schroder, 1972).

Analysis of the test results was performed to determine if a relationship could be found between initially identified stages of concern and conceptual level and the set of attribute variables. A variety of appropriate statistical analyses were selected to test the results including multiple regression, chi-square test of independence, a Pearson product-moment correlation, and a one-way analysis of variance.

Limitations

The limitations to the study were as follows:

(1) The sample for this study was drawn from a select population group which limits the researcher in generalizing findings beyond the population group.

(2) Cognitive development was examined only from the framework of conceptual complexity.

(3) The Stages of Concern Questionnaire is situational and while every attempt was made to control for error, the possibility for error is increased because of the variance of situation from one individual and school to another.

Definition of Terms

Following is a list of terms and their definitions as they apply to this study:

(1) Innovation: An idea, process, product, or program which requires an individual to change behaviors.

(2) Nominal innovation: An innovation that substitutes one isolated component of the system for another.

(3) Radical innovation: An innovation that involves a change of values.

(4) Reform: Innovation on a large scale that is widespread and used throughout a specified target population.

(5) Concerns: Feelings, preoccupations, thoughts, and considerations given to a particular issue or task; an aroused state of personal feelings and thoughts about a demand as it is perceived.

(6) Cognitive Development Theory: Theory based on "the assumption that human development results from changes in cognitive structures, which are the thinking patterns by which a person relates him/herself and his/her environment" (Oja, 1979, p. 2).

(7) Conceptual Systems Theory: Theory based on "the assumption that people have variations in cognitive complexity which characterize the ability of an individual to differentiate and integrate environmental stimuli and which relate to the ability of an individual to function adaptively and efficiently in a given environment" (Oja, 1979, p. 11).

(8) Developmental Stage Theory: Theory based on the assumption that there is a hierarchy of stages, each stage different from other stages, and that the sequence of stages is fixed and invariant. The emergence of higher stages depends upon having passed through lower stages and upon maturation of the person. Higher levels of development represent a more complex, more differentiated, more mature stage (Merriam, 1984).

CHAPTER 2

REVIEW OF LITERATURE

In order to put the problem of this study in perspective and to determine its position in the current body of knowledge, it was necessary to examine the research salient to the variables of interest. This review of literature concentrated on research in the following areas: (1) adult stages of development, (2) cognitive development theories, (3) conceptual development theory, and (4) developmental concerns of teachers theories. Research focusing on the background of these areas and, where applicable, the interrelations among the areas, will be discussed.

Adult Stages of Development

Early Theories

Carl Jung, writing in the early 1930's, formulated life stages based upon his clinical observations. His theories relate to the development of consciousness and propose that each of three stages of life poses special problems that must be resolved at each stage (Jung, 1971).

In the 1950's, Erik Erikson (1963) formulated a theory of the life cycle that included eight psychosocial stages of human development; this theory is still referenced extensively throughout the academic community. The stages represent a series of crises or issues to be dealt with from birth to death. This early work is significant because it, like Jung's work, formulates stages that cover the entire lifespan. Erikson's three adult stages are summarized as follows:

(1) Young adulthood: The struggle between intimacy and isolation. In order to achieve intimacy, a young adult must first achieve a sense of identity so as to be able to share the self with another.

(2) Middle age: Generativity versus stagnation. The important tasks are to give to others, to care for future generations, and to produce something that will outlive the self.

(3) Old age: Achieving a sense of ego integrity. Adults in old age must be able to review their life and feel content that they have contributed to the world. This sense of accomplishment and acceptance will enable the older adult to face death more easily.

Writing at approximately the same time as Erikson, Havighurst (1964) proposed a set of sociocultural tasks that are largely descriptive of ego development. Again, he proposed that successful achievement of the tasks at each stage leads to happiness and success with later tasks, while failure leads to unhappiness in the individual, disapproval by society, and difficulty with later tasks. Havighurst also identified his stages as young adulthood, middle adulthood, and older adults.

Recent Theories

Since the 1950's, there has been a growing body of literature and research in adult development. Perhaps best known is Daniel Levinson's theory of adult development. In extensive interviews with 40 men, Levinson identified six distinct sequential periods of male development, each linked to chronological age. He identified them as: (1) early adult transition or leaving the family, (2) entering the adult world, (3) age 30 transition, (4) settling down, (5) midlife transition, and (6) restabilization or middle adulthood. Levinson theorized that there are periods of stability when one solidifies the life structure, and there are periods of transition when the structure is questioned and changed (Levinson et al., 1978).

Roger Gould (1972) developed a theory that identified stages of adult development that were similar to Levinson's. Gould's theory focuses on inner stages of consciousness in which the adult gives up various illusions and myths held from childhood and confronts the realities of adulthood. When the confrontation occurs, it results in a change in the level of consciousness.

Adult development became popularized with the publication of Gail Sheehy's (1976) best seller, *Passages: Predictable Crises of Adult Life*. She summarized the findings of Levinson, Gould, and others and contributed to the research about adult female development.

Several theorists developed models of adult development related to specific areas of growth. Jane Loevinger's (1976) theory of ego development is based upon defining the ego as a "master trait" that determines how one views the world and responds to it. She theorized that as one ages and acquires life experiences, one moves into stages that are characterized by more self-awareness. At the highest stage of development (although rarely achieved), one would be characterized by an ability to reconcile inner conflicts and would achieve a more consolidated sense of identity.

While this brief review delineates some of the major contributions to the research in sequential models of adult development, there also has been much important research on personality change in adulthood, work and love in adulthood, and events and transitions of adulthood (Merriam, 1984) that has contributed to the body of knowledge of adult development.

Cognitive Development Theories

Cognitive development theories of growth are based on the assumption that human development results from changes in cognitive structures, which are the thinking patterns by which a person relates him/herself and to the environment. The cognitive development theorists provide a structural framework for observing thinking patterns (Oja, 1979).

Piaget's theory of cognitive development is based on the assumption that "knowledge about reality is not attributable entirely to experience (the action of things upon us), but also to reason (our mental actions upon things)" (Elkind, 1975, p. 5). Thus, Piaget's theory is most concerned with how actions become translated into thought. Piaget theorized that there are cognitive stages which share the following characteristics:

(1) Stages imply distinct or qualitative difference in modes of thinking or of solving the same problem.

(2) These form an invariant sequence. While cultural factors may speed up, slow down, or stop development, they do not change its sequence.

(3) Each stage forms a structural whole. It represents an underlying thought organization.

(4) Cognitive stages are hierarchical integrations. Stages form an order of increasingly differentiated and integrated structures to fulfill common functions. Higher stages reintegrate structures found at lower stages (Piaget, 1960).

Piaget did not postulate adult cognitive stages, but did identify stages of cognitive growth of children and adolescents as: ages 0-2, sensori-motor stage; ages 2-7, intuitive or preoperational stage; ages 7-11, concrete operations stage; and ages 11-16, formal operations stage.

William Perry (1970) extended the work of Piaget to examine the cognitive development of college students' thinking. He developed a map of sequential interpretations of meaning that has been linked to cognitive style, teaching style, the nature of knowledge, and other cognitive, ego, and moral development models (Weathersby and Tarule, 1980). Perry's model consists of nine positions with transitions between each position.

Lawrence Kohlberg (1984) developed a theory of moral development which is similar to Perry's findings and theorizes that moral development is linked to intellectual development. Kohlberg's six stages of moral growth adhere to the characteristics of stages listed by Piaget.

The cognitive development theories have important implications for understanding how teachers learn and the conditions that support professional growth. Sprinthall (1979, p. 8) suggested that "developmental theory presents an interesting and sufficiently complex new paradigm for teacher education." He reviewed a set of studies connecting developmental stages with effective performance of adults in general and of adults in teaching. Sprinthall concluded that since developmental stages offer promise as predictors, developmental growth ought to be a basic aim of teacher education.

Conceptual Development

Harvey et al. (1961) developed the Conceptual Systems Theory which describes human development in terms of increasingly complex systems for processing information about people, things, and events. The complexity of one's information processing system is characterized by degree of concreteness or abstractness. Concreteness represents little differentiation or integration of concepts; abstractness represents a high degree of differentiation and integration (Harvey, 1966). The hypothesis that teachers at higher conceptual levels may be better able to function with adaptive, flexible, stress tolerant, creative behavior has been supported by the works of O.J. Harvey, David Hunt, and Harold Schroder (Oja, 1979). Hunt and Joyce (1967) found that variations in conceptual systems control the teacher's ability to function in a highly student-centered environment where teachers are expected to teach using the learner's frame of reference and to encourage students to question and hypothesize.

Schroder et al. (1967, p. 7) provided an understandable discussion of the theory. They stated:

> Some individuals, for example, relate to the environment through relatively few lenses--they see fewer dimensions of a situation, and those few are not very well integrated with one another. At the opposite end of the continuum are individuals who view the environment through many dimensions and manifest a high level of integrative complexity in their relationships to it. . . . Highly integrated information processing systems have many more conceptual connections between rules--that is, they have more schemata for forming new hierarchies, which are generated as alternative perceptions, or further rules for comparing outcomes. High integration structures contain more degrees of freedom, and are more subject to change as complex changes occur in the environment.

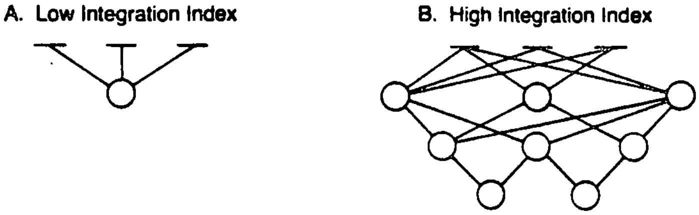
Table 1 relates Hunt's Conceptual Systems Theory to the cognitive development theorists discussed previously. The Conceptual Systems Theory postulates that we can differentiate among individuals in terms of the number of dimensions they use for relating to the environment and the interrelationships of these dimensions.

Table 1. Domains of developmental stages.

THEORIST	Piaget (1963)	Kohlberg (1969)	Loevinger (1966)	Hunt (1974)	Perry (1969)
DOMAINS	Cognitive	Value/Moral	Ego/Self	Conceptual	Epistemological/ Ethical
	Sensori-Motor	Obedience-Punishment (1)	Presocial Impulsive	Unsocialized Impulsive	
	Preoperational	Naively Egotistic (2)	Self-Protective	Concrete Dogmatic	
STAGES	Concrete	Social Conformity (3)	Confirmist	Dependent Abstract	Dualist
	Formal Substage I	Authority Maintaining (4)	Conscientious		Relativist
	Formal Substage II	Principles Reasoning (5) and (6)	Autonomous	Self-Directed Abstract	Committed-Relativist

[SOURCE: Sprinthall-Thies and Sprinthall, 1983, p. 17.]

Figure 1 illustrates the relationships among rules in situations of low and high integration.



[Source: Joyce, 1986, p. 452.]

Figure 1. The integration index.

Individual "A" obtains information through three dimensions, but reduces them to one integrated dimension. Individual "B" also uses three dimensions, but processes the data received in complex ways. Joyce (1986, p. 452) used the following example to explain Schroder's figure:

> To illustrate concretely, let us consider an interpersonal relations situation. Person A would tend to respond to ideas that conflict with his or hers either by incorporating them into his own as if there were no difference, or by rejecting them completely. Person B would dissect the ideas, balancing them against his or her own, perhaps rejecting portions and accepting others, perhaps modifying his or her own.

Schroder et al. (1967) identified and described four stages: (1) low complexity, (2) moderate complexity, (3) moderately high complexity, and (4) high complexity. Characteristics of each stage, as explained by Joyce (1986, pp. 454-456), are as follows:

> Stage 1, Low Complexity: This stage is characterized by extremely fixed patterns of response. The individual tends to see things evaluatively--that is in terms of rights and wrongs--and he or she tends to categorize the world in terms of stereotypes. He or she prefers unilateral social relationships--that is, those which are hierarchical and in which some people are on top and others are on the bottom. He or she tends to reject information which does not fit in with his or her present belief system or to distort the information in order to store it in his or her existing categories.
>
> Stage 2, Moderate Complexity: In this stage the individual is characterized by a breaking away from the rigid rules and beliefs which characterized his or her former stage. He or she is in a state of active resistance to authority and tends to resist control from all sources, even non-authoritative ones. He or she still tends to dichotomize the environment. He or she has difficulty seeing the points of view of others,

> and difficulty in maintaining a balance between task orientation and interpersonal relations.
>
> Stage 3, Moderately High Complexity: At this stage, the individual is beginning to reestablish easy ties with other people and to take on the point of view of the other. In his or her new-found relationships with other people, he or she has some difficulty maintaining a task orientation because of his or her concern with the development of interpersonal relations. He or she is, however, beginning to balance alternatives and to build concepts which bridge differing points of view and ideas which apparently contradict each other.
>
> Stage 4, High Complexity: The individual is able to maintain a balanced perspective with respect to task orientation and the maintenance of interpersonal relations. He or she can build new constructs and beliefs, or belief systems, as these are necessary in order to accommodate to changing situations and new information. In addition, he or she is able to negotiate with others the rules or conventions that will govern behavior under certain conditions, and can work with others to set out programs of action and to negotiate with them conceptual systems for approaching abstract problems.

Silver (1975) reported the behavioral properties of the four conceptual structures based on her research on conceptual levels of principals (Table 2).

Conceptual characteristics were specifically related to teaching behaviors by Murphy and Brown (1970, pp. 529, 540). Their research concluded:

> Teachers in Stage 1 have a tendency to view the world in an overly simplistic, either-or, black-white way; believe strongly in rules and roles; and view authority as the highest good, regarding all questions as having one answer. They thus tend to discourage divergent thinking and to reward conformity and rote learning.
>
> Stage 2 teachers are characterized by conflict between compliance and opposition, are low in self-esteem and high in alienation and cynicism, and are inconsistent and uncertain while functioning in a manner similar to Stage 1 teachers.

Table 2. Behavioral properties of four conceptual structures.

Conceptual Structures	Behavioral Properties
Simple	Categorical (black/white) thinking; Exclusion of conflicting information; Quick decision closure; Little self-concept (behavior anchored in externals).
Moderately Simple	Less absolutism; Some awareness of self as a causal agent; Instability and noncommitment; Negativistic (rebellious) orientation.
Moderately Complex	Less deterministic or judgmental; Several perspectives on each situation; Considerable awareness of self as causal agent; Adaptive behavior.
Complex	Effective adaptation to complex changing situations; High tolerance for ambiguity; Theoretical outlook; Acute awareness of self; No complete closure in decision making.

[SOURCE: Silver, 1975, p. 53.]

> Stage 3 teachers, with strong outward emphases on friendship and dependence on the standards of others, show high affiliative needs based on mutuality and group consensus rather than rules. Their need to control others through dependency may be disguised under the desire to help others. Being more abstract in functioning that Stage 1 or 2 teachers, however, Stage 3 teachers do encourage more pupil self-expression.
>
> Stage 4 teachers, being the most abstract, open-minded, stress tolerant, and creative, regard knowledge as tentative rather than absolute and are able to consider situations from other points of view. Thus Stage 4 teachers, being cognitively complex themselves, tend to encourage more complex functioning in their students.

Harvey (1970) researched the distribution of conceptual systems among preservice and inservice teachers in Colorado. His results are summarized in Table 3.

Table 3. Distributions of conceptual systems types among liberal arts students, education majors, and practicing teachers.

	Stages			
Educational Position	1	2	3	4
	<----------	%	----------	>
Liberal arts students	35	15	20	7
Undergraduate education majors	45	5	25	5
Practicing teachers	55	0	15	4

[Source: Harvey, 1970, p. 13.]

The degree of concreteness or abstractness is the most important structural characteristic of a conceptual system (Pervin, 1970). Concrete functioning is generally characterized by less self-delineation, greater tendency toward extremes, and less flexibility in problem-solving. Greater concreteness tends to be accompanied by absolutism and categorical thinking, by greater belief in external causality and reliance on rules (Harvey et al., 1961). Concreteness disposes toward seeking a simple and highly structured environment (Harvey et al., 1966).

The more abstract person, on the other hand, is able to consider alternatives and is consequently able to integrate facets of the world in terms of their interrelatedness (Harvey et al., 1961; Hunt et al., 1974). The more abstract person is likely to think more relativistically and is less inclined to revert to dualistic levels of thought (Perry, 1970). Abstract conceptual structure is associated with creativity (Charlton and Bakan, 1989), greater tolerance for stress, flexibility, and a wider array of coping behaviors (Harvey et al., 1961; Hunt and Joyce, 1967). A less structured environment is usually required by the more abstract person and he or she usually prefers tasks with greater complexity (Hunt et al., 1974). The more abstract person is able to plan ahead more effectively and is better able to "read and flex," that is, shift behavior from one type of task to another in response to student behavior (Harvey et al., 1961; Hunt, 1975).

Hunt (1975) built upon the original conceptual systems theory (Harvey et al., 1961) and defined conceptual level by degree of abstractness (differentiation, integration, and discrimination) as well as interpersonal maturity increasing self-responsibility. A person at a higher conceptual level is more structurally complex, more capable of responsible actions, and most important, more capable of adapting to a changing environment than is a person at a lower conceptual level (Hunt, 1975).

A study conducted by McNergney et al. (1980) at the University of Minnesota, based largely on the work of Hunt and his associates, supported Hunt's findings that teachers who are complex processors of information are flexible and thus better equipped to meet the needs of students than teachers who are more concrete in the ways they characterize teaching and learning. Additionally, the Minnesota study concluded that teachers' implicit conceptual frameworks could be altered providing application for this research to change facilitators.

A number of studies particularly pertinent to teacher education have been conducted using the Conceptual Systems Theory developed by Hunt (1970). Research linking conceptual level and learning style conducted by Yarger (1976) concluded that teachers of high conceptual level were better able to predict their own best learning style than low conceptual level teachers, and that high conceptual level teachers design materials for their classrooms that are to be used as part of primary instructional strategy, while low conceptual level teachers design materials to supplement already existing or required text. Murphy (1970) examined the teaching styles of college students enrolled in teacher education as compared to conceptual level. She concluded that teachers with high conceptual level used teaching styles characterized by more handling of information by helping students theorize and express themselves while low conceptual level teachers' style was characterized by questioning for precise answers. Tom and associates (1984) found that low conceptual level teachers were more likely to utilize stereotypes relating to grades and occupational expectations based on gender, ethnicity, and socioeconomics than high conceptual level teachers.

Early research in conceptual complexity focused on assessing flexibility and rigidity as conceptual styles. Research conducted with teaching interns at Harvard Graduate School of Education (Sprinthall et al., 1966) concluded that effective teaching and cognitive flexibility are related. Interns that were found to have highly rigid cognitive structures, even when provided with intensive supervision by highly skilled master teachers during their internship, were evaluated as noneffective, some of whom were eventually dropped from the teaching intern program. However, this study consisted of a small sample size and was conducted as a pilot study, so conclusions cannot be generalized. As early as 1959, Gardner and others found that subjects classified as constricted/rigid seemed particularly resistive to change, "preferring to maintain sets long after they were appropriate, another indication that they could not take advantage of available cues" (Gardner, 1959, p. 53). Gardner's study could have implications for education in that teachers who are cognitively rigid would miss the cues that another approach was indicated in their teaching style to meet student needs effectively. Bieri (1955) and Kelly (1955) concluded in their early studies of cognitive complexity that people with a more flexible structure, as opposed to those with a more rigid structure of constructs, are able to differentiate better among objects or situations.

In a 1954 study, Rokeach researched the relationship between stress or anxiety and cognitive complexity. He determined that stress produces, for the person who is cognitively rigid, a reliance on irrelevant factors in determining what course of action is to be taken. He concluded that a cognitively rigid subject, "becomes highly attuned to irrelevant internal and external pressures and, accordingly, unable to evaluate information independent of source" (Rokeach, 1954, p. 62). The implication for teaching is that a high conceptual teacher will be able to carefully assess competing stimuli, even under the stress of classroom teaching, more effectively than low conceptual teachers.

Research linking conceptual level with teachers' choice of a problem-solving paradigm concluded that a relationship exists between these two variables (Gordon, 1977). Additionally, Straussner (1982) found that problem solving style as measured by cognitive flexibility/rigidity and teachers' expectations for students were related. A study examining ratings of college instructors by students and the students' cognitive development found that there was a correlation between student evaluation of instructor ratings and cognitive development, suggesting that high cognitively complex students were more sensitive to and able to differentiate among differing social stimuli (Trabin and Doyle, 1981). Interestingly, Trabin and Doyle's study found cognitive complexity to be unrelated to gender, although they did find a positive relationship between cognitive complexity and grade point average.

The conceptual level of teachers was measured in relation to their preference for support in the supervisory tasks of staff development, curriculum development, and instructional improvement in a 1984 study (Konke, 1984). Konke hypothesized that teachers at a high level of conceptual development would prefer to be more involved with others and more flexible in adapting their teaching methods than teachers at lower conceptual levels. Konke was unable to establish a correlation between any of the variables she identified and conceptual level.

In examining the relationship between supervision and teachers' conceptual levels, Calhoun (1985) found that conceptual level does in some ways relate to "real world" differences in teacher behavior with inservice education and classroom environment. High conceptual level teachers were found to participate in more informal professional development activities than low conceptual level teachers and high conceptual level teachers read more professionally helpful books, own more instructional and professional resource materials, and belong to more professional organizations than low conceptual level teachers. Calhoun did conclude that when higher conceptual level teachers have control over their inservice, they seek out more activities than lower conceptual level teachers. However, her findings show that when the inservice is controlled by the school system, the conceptual level has no relationship with professional activities sought.

Gordon (1976) found prospective teachers' choice of rule-example order in teaching mathematics to be related to conceptual level. Kagan and Pietron (1987) conducted a study to measure to what degree achievement in computer literacy course related to cognitive level and concluded that despite the many empirical connections drawn between general problem-solving ability, or between the ability to think abstractly, and the ability to learn how to use computers, their study could only marginally support the conclusion that general cognitive aptitudes were relevant to the task of learning to use computers. Packer and Bain (1978) attempted to demonstrate through their research that an educational advantage could be obtained by matching cognitive style of student and teacher. They concluded that teachers' ability to communicate with students and assess their progress improved when cognitive styles matched; however, they cautioned generalization beyond their experimental group.

These studies provide mixed evidence that teachers at higher conceptual levels may be more able to function with adaptive, flexible, tolerant, and creative behavior. The research evidence may suggest that teachers at higher conceptual levels may be able to assume multiple perspectives, utilize a wide variety of coping behaviors, employ a broad repertoire of teaching models and, consequently, be more effective with students (Oja, 1979).

Developmental Concerns of Teachers

Francis Fuller and her colleagues at the University of Texas in Austin are credited with the best known example of an empirically constructed theory of teacher development. Fuller's work was in the area of preservice education and resulted from her observations that there is a mismatch between what preservice students get in their education courses and what they need. Fuller's initial developmental conceptualization characterized teacher concerns as a dichotomy of self and others. Her initial study (Fuller, 1969) involved counseling seminars for students who were involved in student teaching. Students were encouraged to talk about their concerns in these counseling sessions. The seminars were taped and each statement classified according to its main topic. The frequencies of topics discussed and the clinical impression gained from listening to the tapes suggested a dichotomy between concerns with self and concerns with pupils. Concerns with self were prevalent in the first three weeks of student teaching and concerns with pupils appeared toward the end of the student teaching experience.

In a follow-up study, student teachers were asked every two weeks during the semester to write about what concerned them most. The statements were classified this time into three categories: (1) concerns with self-adequacy, (2) concerns with misbehavior, and (3) concerns about class control. Twenty-nine student teachers were involved; of this group, 27 expressed concerns about self-adequacy and none expressed concerns about pupil learning (Fuller, 1969).

These two studies formed the basis of Fuller's theory of Developmental Concerns of Teachers. To further test her theories, Fuller (1969) examined the concerns of experienced teachers. Fuller regrouped the data of other researchers who had surveyed the problems and satisfactions of teachers to show that experienced teachers are less often concerned with maintaining discipline or worried about criticism of inspectors than are inexperienced teachers. The satisfactions of experienced teachers come from success with pupils and they are most often concerned about progress of pupils. Jackson (1968) confirmed Fuller's findings, concluding that outstanding teachers expressed concerns about pupils' progress. Several teachers in Jackson's study spontaneously recalled their decreasing preoccupation with discipline and self-adequacy. Fuller (1969, p. 221) concluded: "When concerns are 'mature,' i.e., characteristic of experienced teachers, concerns seem to focus on student achievement and self-evaluation as opposed to personal gain and evaluation by others."

Older teachers, identified as superior, were not concerned with mere adequacy, but instead with the impact that they were having on students. Fuller did note that experienced teachers who were judged to be inferior had concerns about their own adequacy, similar to those of beginners. Fuller's theory was expanded and refined in a subsequent work by Hall and Loucks (1978) and others into three developmental substages of concerns: (1) self concerns, (2) task concerns, and (3) impact concerns. In 1970, Fuller proposed a model for personalized teacher education based on the concerns of teachers and further pursued research into the dynamics of teachers' concerns and their assessment, arousal, and resolution (Fuller and Manning, 1972; Fuller et al., 1973; Fuller and Bown, 1975).

Colleagues of Fuller's and researchers at the Research Development Center for Teacher Education at Austin, Texas, hypothesized that teachers involved in change appeared to express concerns about innovations that were similar to those which Fuller had identified with teachers about teaching. Procedures were set up for documenting the concerns expressed by adopters of various educational innovations. The researchers attempted to determine individual characteristics that could be related to teachers' concerns about change by examining such variables as age, gender, years of teaching experience, years of preparation, number of years at a particular school, and teaching level. They concluded that none of these variables significantly influenced teachers' concerns about the uses of an innovation (Rutherford, 1986). The research conducted at the University of Texas in Austin was consistent with the more recent findings of Waugh and Punch (1987) who reported finding individual variables such as gender, subject taught, and qualifications accounting for only approximately two percent of the variance in receptivity. Qualitative data were collected over a three year period, resulting in a theory about concerns held by adopters of innovation. In time, seven stages of concern about the innovation were identified. Those stages, as conceived by Hall et al. (1977, p. 7), are:

> 0 Awareness: Little concern about or involvement with the innovation is indicated.
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> 1 Informational: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about herself/himself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects, and requirements for use.
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> 2 Personal: Individual is uncertain about the demands of the innovation, her/his inadequacy to meet those demands, and her/his role with the innovation. This includes analysis of her/his role in relation to the reward structure of the organization, decision making, and consideration of potential

conflicts with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be reflected.

3 Management: Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.

4 Consequences: Attention focuses on impact of the innovation on students in her/his immediate sphere of influence. The focus is on relevance of the innovation for students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes.

5 Collaboration: The focus is on coordination and cooperation with others regarding use of the innovation.

6 Refocusing: The focus is on exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternatives to be proposed or existing form of the innovation.

Table 4 relates the stages of concern as identified by Hall et al. (1973) to the findings of Fuller regarding teacher concerns of self, task, and impact.

Hall et al. (1973) hypothesized that there is developmental movement through these stages; that is, certain types of concern must be resolved before arousal of other types of concerns will occur -- thus the names "stages." It appears that a person's concerns about an innovation develop toward the later stages with time, successful experience, and the acquisition of new knowledge and skill.