Assessment of teacher perceptions of teaching styles in grades K-8 : an instrumentation development
by Shirley Ann Handsaker

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University

Abstract:
Educators have recognized that students learn in uniquely individual ways. Research theory advocates the adaptation of instructional techniques to meet the requirements of individual learners, but there is lack of agreement with respect to how and to what extent this should be done. The reality of individual differences demands that teaching methods be diverse, since instructional approaches that are effective for some students may impede learning for others. Therefore, it is important to investigate teaching practice and its underlying theories. The goal of this study was to determine the degree to which a valid and reliable instrument could be developed to assess teacher perceptions of responsibilities, abilities, and effectiveness in teaching to the individual needs and learning styles of students, and to further measure the degree to which observations of classroom practices were predictive of demographic group membership. Equally important in this study was the development and pursual of a process for instrumentation development.

Questions from the literature were selected to measure instructional planning, teaching characteristics, teaching methods, student groupings and classroom environment. A panel of experts determined face validity of questions, and the questionnaire was piloted with one hundred nineteen kindergarten through grade eight teachers.

Test/retest correlation coefficients were generated, and the revised questionnaire was field-tested with eighty-two classroom teachers. Consenting respondents within a forty-mile radius were observed. Responses were grouped in accordance with factored scores, and were submitted to a discriminant analysis assessment, utilizing questionnaire and observed responses as predictors of demographic group membership.

The procedure established for instrument development was carefully followed. This procedure may have value for other researchers. The instrument developed in this study was shown to have content (face) validity and internal construct validity, but was determined to be of low reliability. Thus, no conclusive generalizations could be made based upon the instrument itself. A major recommendation was that the development of a long-term interview format might prove to be a productive method to assess teaching styles. Caution was given against utilizing untested instruments to gather data.

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by

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A thesis submitted in partial fulfillment
of the requirements for the degree

of

Doctor of Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

December, 1986

APPROVAL

of a thesis submitted by

Shirley Ann Handsaker

This thesis has been read by each member of the thesis 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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CHAPTER ONE

INTRODUCTION

It has long been recognized by educators that students learn in uniquely individual ways. Children bring certain attitudinal and content predilections to each learning situation which, when combined with individual perceptions and processing skills, constitute each child's particular learning style. Extensive data verified the existence of individual differences among children. According to Dunn, Dunn and Price (1979), these differences are so extreme that teaching methods, materials or grouping procedures that are successful for some students can prevent or impede learning for others. Since learners differ, the search for generally superior methods of teaching should be supplemented by a search for ways to fit the instruction to each kind of learner. The instructional method that is best "on the average" is not best for all persons (Cronbach and Snow, 1977:1).

Learning is a process of infinite complexity, observed and studied for centuries from a great many perspectives. Research theory, generated by psychologists and educational researchers, supports the concept of adaptation of instructional techniques to meet the requirements of individual learners. However, there is

lack of agreement with respect to how and to what extent this should be done.

Forty years ago, psychologist Nathaniel Cantor (1946:101 and 185) pointed out that a gap existed between theory and practice:

> The public elementary and high schools and colleges generally project what they consider to be the proper way of learning, which is uniform for all students . . . that there are individual differences in learning has been recognized in theory as often as it has been denied in practice.

In past and present practice, adaptation of instruction to meet individual needs has frequently been interpreted to mean little more than varying the pace at which students work through the prescribed curriculum.

Rennels (1976:10) has alleged:

> educational institutions founded on Euclidean linear throught processes, have systematically eliminated experiences that would assist young children's development of visualization, imagination and/or sensory-perceptual abilities.

The Dunns (1979) stated that 90 percent of all school instruction occurs through the lecture and/or the question and answer methods, while only two or three students in each group of ten will learn best by listening. Hughes (1959), Travers (1961), Flanders (1960), Parakh (1965) and others reported consistently that teachers talk between 65 and 75 percent of all class time, on the average, and that pupil talk is characterized primarily as response to teacher initiated communication.

Roger Sperry's (1964) investigations with human cerebral hemispheres suggested that educational institutions, rather than continuing to place emphasis only upon those functions identified to

reside in the left cerebral hemisphere (verbal communication such as reading, writing, and listening), should become concerned with developing equal qualities of left and right cerebral functioning in children by also emphasizing visual, spatial and sensory activities. Herman Epstein (1978) reinforced Sperry's thoughts by stating that schools cannot continue to ignore the holistic needs of students. These needs transcend programs with over-balanced cognitive predominance.

Albert Einstein (Sagan, 1979:21) wrote:

> I remember my student days; I the disorderly student and a daydreamer. It is a little short of a miracle that modern methods of instruction have not already completely strangled the curiosity of my inquiry, because what this delicate little plant needs most, apart from initial stimulation, is freedom. Without that it is surely destroyed.

Could it be that many potential Einsteins have been permanently discouraged through competitive examinations and the presentation of curricula through predominately left brain channels?

Since 1925, when Carleton Washburne pointed out that schools needed to adapt to the differing individuals who attend them, educators have searched for relationships between techniques of teaching and pupil growth. The word "individual" is generally interpreted to mean one-to-one instruction, or one child working alone. Anthony Gregorc (1977:20) stated:

> The secret to understanding this vital word as it applied to both learning and teaching lies in the two parts of which it is comprised: <u>indivi</u> (non-divisible) and <u>dual</u> (duality).

Gregorc referred to the dualities in people, the dualities that influence learning and teaching, and the duality in the use of

abstract and concrete reference points for thinking. Other dualities and their effect on the total learning process must also be considered in order that education might address the abilities, needs and concerns of the individual.

The reality of individual differences demands an approach founded on the fact of diversity. Learning is a multidimensional phenomenon. Authorities such as Chall (1967), Durkin (1969), Heilman (1969), and Karlin (1971) concluded that the classroom teacher is the single most important variable influencing how well a child learns. Medley (1977), after reviewing 289 studies which examined the relationship between teacher behavior and pupil learning, concluded that teachers may need to use different strategies depending on the context or situation. Flanders (1965) stated that students will learn more if they are allowed to work with flexible teachers, capable of utilizing diverse strategies.

It is important for educators to understand the relationship between the various processing skills and how they function with each other to enable a student to learn a given task (Mann, 1979). McCarthy (1981) posited that students need to make choices, manipulate, explore and experience in order for learning to take place. She stated (1981:108):

> These activities are often found in primary schools, but exploration, manipulation, experimentation in the higher grades is frequently limited to reading another book or writing another essay, activities that appeal to only 25 percent of our students.

McCarthy suggested that teaching be equally divided into four parts: reflective reason based upon experience; observation; experimentation;

and active application. This style of teaching is based upon Kolb's Model (Kolb, Rubin and McIntyre, 1974), a four stage model in which Kolb saw successful learning as a constant tension between activity and observation, and involvement and reflection. He perceived learning as requiring opposite abilities, and the learner must choose which set of learning abilities s/he will use in any specific situation. McCarthy (1981) suggested that 25 percent of teaching time be directed to each of the following: reflective reason, observation, experimentation, and active application. This would enable each learner to be instructed in the most comfortable, productive method for at least one-quarter of the time.

Several studies (Flanders, 1960; Hughes, 1963; Travers, 1961) indicated that many professional teachers possess a narrow range of teaching styles. A teacher who cannot readily vary his or her method or style is seriously limited. S/he needs to be able to select from a repertoire of tactics which will lead to different objectives and induce different students to learn (Hunt, 1965). Anthony Gregorc (1979) maintained that developing an awareness of teaching and learning styles shows teachers the need for switching styles in the classroom setting so that all learners can experience comfortable style matches as well as less comfortable mismatches. Style-flexing and stretching can help create the abilities for success under a wide variety of conditions (Gregorc, 1982). Ned Flanders (1965) stated that flexible teachers who shift from indirect to more direct approaches to students with the passage of time

enable students to learn more. The effectiveness of education depends upon the flexibility of the teacher.

Recently, public concern has focused on the right of the individual to expect results from education and on a demand for accountability from educational personnel. Benjamin Bloom (1976) reported that teachers in general expect one-third of all students to adequately learn; one-third to learn a good deal, but not to master all concepts presented; and one-third to fail or master only minimal amounts of content. However, he suggested that perhaps as many as 90 percent of all students can master instructional content, and that it is the task of educators to find the means of quality instruction which will enable students to do so. Devising and implementing specific educational techniques for quality instruction that are compatible with student learning styles and measuring the expected and actual achievement of students provide a system of educational accountability.

Abraham Shumsky (1968) posited that perhaps the most significant contribution of American education to the world is the commitment to the ideal of helping every child develop his or her individual characteristics and potential to the highest possible level: the uniqueness of the individual is guarded, conformity rejected, and the development of plurality of expression encouraged. Our concern over preserving the uniqueness of the individual is the basis for a variety of forms of educational practices, ranging from local control of the school to individualization of instruction within the classroom. This value underlies the teacher's continuous effort to tap

the level of ability of individual children, and to use a large variety of teaching techniques in order to reach the maximum number of individuals in the classroom. Children vary qualitatively in the way they approach learning, in their learning styles. By being aware of detailed patterns of individual learners, teachers can build on individual differences.

Considerable evidence indicates that American education has not met the needs of its consumers (Dunwell and Wendel, 1976). The educational community seems to have failed to intelligently consider the wide range of information on the nature of the learner, of knowledge and of instruction. The utilization of data gleaned from the behavioral sciences has not become a part of the educational process. Bruce Joyce (1981:2) stated:

> Because ideas that are not brought to fruition are less threatening than are those that are acted upon, we find a much greater diversity of ideas than we do of practice.

Educational practices are not necessarily reflective of educational theory.

The time has come for instructional practices to be reevaluated in terms of current knowledge. Teaching methods must be based on a learning model designed to reflect scientific knowledge of learning (Wallen and Travers, 1963). Recognized teaching methods used in the past have, to a great extent, been dictated by tradition and intuition. However, analytical research of the past decades provides various models and theories for instruction. An accumulation of research data offers a systematic design of behavior for teachers that would

maximize the achievement of pupils with respect to specific objectives.

Wallen and Travers (1963) stated that systematic teaching methods should be founded upon the educational objectives that the method is intended to achieve, and that the methods should be built in terms of a theory of behavior which reflect the conditions under which particular learning could be most effectively produced. Hunt (1981) recommended that studies of student learning styles begin with a more thorough understanding of teaching practice and the implicit theories that underlie it. Teachers' implicit ideas about student learning styles and their intuitive matching models are a rich source of information.

Advanced knowledge of the psychology of learning as related to student learning styles now exists. This body of knowledge has the potential for providing the solid foundation needed for the rational construction of teaching methods. It is necessary for educators to accept the challenge of individual differences and to address the need to help the teacher and the learner understand how and why human beings learn (Gregorc, 1979). Theoretical and practical knowledge regarding the diagnosis and application of teaching and learning styles is now available.

Need for the Study

Educators are criticized for failing to base instruction on the individual differences that exist among learners (Silberman, 1970; Glasser, 1969; Dunn and Dunn, 1979; Rennels, 1976; Sperry, 1964).

However, the concept of learning style promotes acceptance of individual differences as the norm rather than the exception, and the concept of teaching style implies necessity of flexibility in selection of tactics for different purposes and students. The public demand for accountability in education has led to increased research on teacher effectiveness and to the establishment of programs to improve teaching at all levels. The need to examine one's teaching style and behavior must be experienced before growth can take place (Ishler and Ishler, 1980).

People develop as total beings. Therefore, educators need to function by dealing interdependently with affective and cognitive aspects of learning (Barnes, 1980). Society is changing so rapidly that a great asset for future adults will be flexibility. Knowledge of teaching and learning styles will help both teachers and students to be consistently better at learning and adapting to future changes. Teaching style is more than a methodology: it places subjective demands upon the learner who may or may not have abilities to match such demands. According to Gregorc (1979), as we understand more about learning and teaching styles and how the mind operates, we will improve mental health and self-understanding as well as increase learning.

Dunn and Dunn (1977) recommended that teaching styles present in the classroom be identified in order to form groupings of complimentary student and teacher styles. Ronald Schmeck (1982:79) stated, "I believe we need more research that would provide an opportunity to observe interactions between instructional treatments and learning

style." Hunt (1981) recommended that studies of student learning styles begin with an investigation of teaching practice and its underlying theories. There is also a need to coordinate the current knowledge of learning and teaching style concepts. Available knowledge is diverse and not readily accessible to the practitioner.

Cornett (1983:8) stated:

> It is an exciting time to be an educator. Never before have we known so much about the central organ of learning--the brain in all its complexity. In the last decade we have witnessed an explosion of new information about the brain resulting in fascinating theories, some supporting and others refuting what we have long thought or intuited about how we learn.

The more teachers know about their own teaching and learning styles, the easier it will be for them to see specific ways their styles can be amplified or modified. Once teachers gain an appreciation of the variety of learning styles, they can respect learning style differences and adapt their teaching styles for different situations. They may also be alert to situations in which students' learning styles limit their success in academic areas (Cornett, 1983).

The practitioner (the teacher) is the key to educational excellence. Identifying teacher perceptions is one expedient way of providing the data necessary for educational evaluation. Arthur Combs (1982:3) stated:

> Everyone behaves in terms of his or her perceptions or beliefs, and teachers are no exception. . . Teacher beliefs are crucial. They determine how teachers behave and how successful they are likely to be in carrying out their professional tasks.

There is a need to determine teachers' perceptions of their particular roles in teaching to the individual needs and learning styles of students.

According to Horak (1980), measurement and categorization of beliefs and attitudes about educational practices have been successful in identifying beliefs and in predicting future teacher behaviors. However, research studies of teachers' patterns of belief related to attitudinal statements on teaching have shown that unidimensional continuums such as direct-indirect, integrative-dominative, or concrete-abstract do not accurately reflect the complex nature and interactions of teachers' belief systems. Under these continuums teachers appear to hold many conflicting beliefs.

> Classification schemes will not ever completely describe teachers. Yet they need to be developed to effectively support research on the interactions between teachers and students, and to better understand the precursors of teacher behavior [Horak, 1980:12].

It may be necessary for future research on teacher beliefs and behaviors to consider teacher actions in a more global sense (Horak, 1980).

Perceptions correlate with attitudes, and there is good evidence that attitudes are predictive of present behavior (Oppenheim, 1966). Procedures of indirectly assessing attitudes and actual behaviors are widely employed in science and the applications of science (Ryans, 1960). However, this researcher, after extensive review, was unable to find any instrument of adequate validity and reliability that was designed to measure teacher attitudes toward accommodation of student learning styles. Data regarding available

instruments (Dunn and Dunn, 1977; Canfield, 1975; Heikkinen, 1978; and Silver and Hanson, 1980) show either low validity and reliability figures, or no figures at all.

The focus of this study was to develop a valid, reliable instrument which could be used to ascertain teacher perceptions of actual and preferred roles in teaching to the individual learning styles of students. The need for a conveniently managed and easily interpreted instrument is vital to the accumulation of data necessary to guide practitioners in the application of learning theory. This instrument would be an essential contribution to the body of knowledge which bridges the span between the theory and practice of learning and teaching styles.

Statement of the Problem

The purpose of this study was to design an instrument which could be used to determine a teacher's perceptions of his or her responsibilities, abilities and effectiveness in teaching to the individual needs and learning styles of students. Regular public education kindergarten through grade eight classroom teachers were the focus of the study.

General Questions to be Answered

The central question asked in this study was: To what exent if any, can a valid and reliable instrument be developed to ascertain teacher perceptions of responsibilities, abilities and effectiveness in teaching to the individual needs and learning styles of students,

considering the pragmatic limitations of this educational research community? Also, to what extent is it possible to predict demographic group membership of teachers responding to the questionnaire by actual observation of classroom practice?

General Procedures

The procedures followed in this study were:

1. Documentary research. A thorough review of the literature as it pertains to teaching styles and student learning styles was conducted. The emphasis of this review was on understanding the underlying factors involved in teaching to the individual learning styles of students at the kindergarten through grade eight levels.

2. Definition. A working definition of learning style and teaching style for the purpose of this study was established.

3. Instrumentation. The literature pertaining to instrumentation development was reviewed, and procedural steps were outlined.

4. Question development

   a. Validity. Content (face) validity was determined by using a panel of experts and internal construct validity determined by a factor analysis of data on questions considered. A pilot study also determined ease of use.

   b. Reliability. Test/retest reliability and internal consistency were assessed to determine specific items for consideration of the questionnaire.

5. Panel review. A revised questionnaire developed from the above procedures was submitted to a panel of experts to reestablish content validity.

6. Field-testing. The questionnaire was initially field tested with one hundred nineteen Montana teachers, and was then utilized with eighty-two regular education kindergarten through grade eight classroom teachers in public elementary schools in Gallatin and Lewis and Clark Counties in Montana.

7. Observational data. All consenting respondents within a forty-mile radius of Bozeman were directly observed in order to assess the predictability of demographic groups responding to the questionnaire.

These procedures enabled the researcher to develop and field-test an instrument which was intended to be used to determine the regular education public kindergarten through grade eight classroom teachers' perceptions of their responsibilities, abilities and effectiveness in teaching to the individual needs and learning styles of students. This inventory was field-tested during the 1984-87 school years.

Limitations and Delimitations

The review of literature conducted for this study was confined to an ERIC search, the library at Montana State University, Inter-Library Loan services, and the investigator's personal library. The study was limited to the development of an instrument which was intended to be used to determine a teacher's perceptions of his or her responsibilities, abilities and effectiveness in teaching to the individual needs and learning styles of students. Regular public education kindergarten through grade eight classroom teachers from Montana participated in the field-testing of this instrument during

the 1984-87 school years. Direct observations were limited to one hour visitations of all consenting respondents within a forty-mile radius of Bozeman. It is recognized that longer observations of the entire population of teachers may have increased validity. However, it was pragmatically necessary to impose these limitations on the study. Although the instrument itself was designed to measure perceptions, perceptions are highly correlated with attitudes, and there is good evidence to draw the conclusion that attitudes are predictive of present behavior (Oppenheim, 1966). Procedures of indirectly assessing attitudes and actual behaviors are widely employed in science and the applications of science (Ryans, 1960).

Definitions of Terms

For the purposes of this study, certain key terms were considered in the following context:

1. Adaptive Education: Education in which the environment accommodates to the existing modes and processes of learners, and also influences these processes through instruction (Glasser, 1977).

2. Affective Behaviors: Motivational processes of the student that include liking and disliking (Keefe, 1979a).

3. Attitude: A state of readiness; a tendency to act or react in a certain manner when confronted with certain stimuli (Oppenheim, 1966).

4. Cognition: Cognitive processes; all the processes by which sensory input is transformed, reduced, elaborated, stored, recovered, and used (Scott, Osgood and Peterson, 1979).

5. Cognitive Style: A cognitive characteristic mode of functioning that individuals reveal throughout their perceptual and intellectual activities in a highly consistent way (Witkin, 1979).

6. Direct Teaching: Teacher verbal behavior classified as lecturing, giving directions or criticizing or justifying authority (Amidon and Flanders, 1961).

7. Indirect Teaching: Teacher verbal behavior classified as accepting and clarifying feelings, praising and encouraging, accepting or using student ideas, and asking questions (Amidon and Flanders, 1961).

8. Individuality: Distinctive and particular individual qualities (Wiles and Bondi, 1979).

9. Instruction: The provision of the environmental conditions which allow the learner to proceed from a present entering behavioral repertoire to the educational goals described as the desired outcome (Skinner, 1957).

10. Learning Style: Characteristic cognitive, affective and physiological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Keefe, 1979a).

11. Multi-Grade Level Classroom: A classroom consisting of two or more grade levels.

12. Perception: Intuitive judgment; one's own frame of reference (Wiles and Bondi, 1979).

13. Physiological Behaviors: Biologically based response modes (Keefe, 1979a).

14. Provisioning: A teacher's act of providing a variety of techniques and materials to accommodate the different learning styles of students (Simon and Bryan, 1977).

15. Regular Education: Education designed for normal, non-exceptional students; does not include special education.

16. Style-Flex: The ability to shift to a style of teaching different from one's own primary style (Simon and Bryan, 1977).

17. Teaching: A system of actions intended to induce learning (Smith, 1960).

18. Teacher Ability: The quality or state of being able to teach; teaching skill.

19. Teacher Effectiveness: The teacher's effect on the realization of some value, usually some educational objective, defined in terms of desired pupil behaviors (Gage, 1963).

20. Teacher Responsibility: The charge, duty or obligation of the teacher.

21. Teaching Method: Patterns of teacher behavior that are recurrent, applicable to various subject matters, characteristics or more than one teacher, and relevant to learning (Gage, 1963).

22. Teaching Style: The teacher's personal behaviors and media technologies chosen to deliver and receive information (Gregorc, 1979).

The review of literature presented in Chapter Two will represent a means of becoming familiar with the data which was pertinent to

the investigator's study. The emphasis of this review was on (1) understanding the underlying factors involved in teaching to the individual needs and learning styles of kindergarten through grade eight students, and (2) pursuing approved methods of instrumentation development.

CHAPTER TWO

REVIEW OF LITERATURE

Educators have long been aware that students differ in how they learn. Some students learn better by listening, others by working independently, and so forth. Learning style describes a student in terms of those educational conditions under which s/he is most likely to learn, and suggests that certain educational approaches are more effective and efficient than others for the student (Hunt, 1979). Keefe (1979b:124) stated:

> An understanding of the way students learn is the door to educational improvement. And learning style diagnosis is the key to an understanding of student learning.

The concept of student learning styles revives the hope for authentic individualized education: it starts with the learner and then proceeds to a consideration of teaching and the learning environment.

In this section a critical review of relevant psychological and educational research regarding student learning styles and implications for classroom teachers is presented. Focus is placed on modern learning style theory, its historical context and background, in order to develop an understanding of the range of teaching styles needed to accommodate student learning styles. Theories of learning expounded by two major schools of psychology, behaviorism and cognitivism, are stated.

Historical Development of Student Learning Style Theory

One characteristic of education is exceptional: perhaps more than any other cultural process it carries almost all of its past with it into the present, even if this past rests in rather covert assumptions, practices, attitudes and beliefs (Burton, 1962). The history of learning theory is replete with movements that briefly influenced the course of the profession, and then passed on, leaving a legacy upon which researchers, philosophers and practitioners could build. According to Anderson and Bruce (1979), it is becoming apparent that the idea of learning styles may join the select group of concepts that have had a major and lasting impact on education.

Interest in learning, thinking and perceiving has a long history. At least since the time of the ancient Greeks, philosophers have speculated about these topics, and attempts to explain them make up a considerable part of the history of philosophy (Hill, 1963). It was not until the nineteenth century that attempts were made to study these topics experimentally.

The first psychological laboratory was founded by Wilhelm Wundt in Germany in 1879 (F. Allport, 1955). Wundt and his colleagues were largely interested in conscious experiences. They wanted to understand human sensations, thoughts and feelings (Hill, 1963).

This kind of introspective, mentalistic psychology, developed in Germany, became to a large extent the standard for the rest of Europe and for America. In the United States, however, there was a

considerable trend toward the study of objective behavior as well as conscious experience. Early in the twentieth century the features of American psychology came more and more into conflict with the German tradition.

In 1913 John B. Watson (1879-1958) was the vocal spokesman, espousing a psychology oriented toward objective behavior and practical usefulness (Hill, 1963). Watson's theory related to five trends in psychology: associationism, the analytic approach to science, a physiological orientation, the habit concept, and objectivity (Kimble, 1961). The convergence of these influences gave rise in America to Behaviorism.

Behaviorism

Hill (1963) stated that behaviorism is an objective association psychology, with an emphasis upon habit, biological in viewpoint and analytic in approach. Watson was interested only in behavior, not in conscious experience. Watson's great contribution to the development of psychology is his rejection of the distinction between body and mind and his emphasis on the study of objective behavior (Hill, 1963).

All behavioristic theories of learning are also associationistic; they include those of Thorndike, Skinner, Pavloc, Guthrie and Hull (Bower and Hilgard, 1981). Behaviorists study what people do as a result of how they think and feel. To the behaviorist, the aim of education is to teach thinking and mastery of information. Learning

is believed to be incremental, involving formation of new connections. Watson and Guthrie differed from other behaviorist theorists in that they made no use of the concept of reinforcement.

For nearly half a century, one learning theory dominated all others in America. The theory of Edward L. Thorndike (1874-1949), the "father of American psychology," based learning on association between sense impressions and impulses to action (responses). Thorndike's system, connectionism, was the original stimulus-response psychology of learning (Bower and Hilgard, 1981). Thorndike became the first reinforcement theorist.

B. F. Skinner (born 1904), like Thorndike, proposed a connectionist theory; both took a keen interest in problems of education and emphasized reinforcement as a basic factor in learning. Skinner recognized two different kinds of learning, respondent and operant. Respondent behavior is defined as automatic response to a specific stimuli. Operant behavior works on the environment in response to no particular stimuli (Hill, 1963). Skinner was largely concerned with positive reinforcers, and recognized the existence of negative reinforcers.

Ivan Pavlov (1849-1936) investigated conditioned reflexes relative to reinforcement. He had a major impact upon learning theory, particularly his systematic investigations, his theories of association, and his biases about what phenomena are worthy of investigation. According to Bower and Hilgard (1981), Pavlov ranks with Freud and Wundt as a major influence upon American psychology.

The system proposed by Edwin R. Guthrie (1886-1959) is an objective stimulus-response association psychology, and used the conditioned response terms from Pavlov while being practical and relevant as espoused by Thorndike (Bower and Hilgard, 1981). Guthrie's law of learning stated that a combination of stimulus which is accompanied by a movement will on its recurrence tend to be followed by that movement (Guthrie, 1935).

Clark Hull (1884-1952) was a behaviorist whose systematic theory emphasized habit as an explanation for the responses of organisms (Bower and Hilgard, 1981:95). He theorized that a response is always the result of a stimulus. His postulates were concerned largely with the systematic presentation of various other factors and their relationships (Hill, 1963). Proponents of his theory, who nurtured, extended, and applied his ideas in later years, are typified by Kenneth Spence, Neal Miller, O. H. Mowrer, Judson Brown, Grice, Amsel, Wagner, and F. A. Logan (Bower and Hilgard, 1981). These individuals were dominating figures in American psychology since 1940, and significantly altered learning theory.

Gestalt or Cognitivism

Gestalt or Cognitive Theory involves the study of the mental processes involved with thinking, planning, decision making, perception, aesthetics, and personality. To the cognitivist, learning is understanding or insight and the ability to transfer new insights to other situations.

One year before Watson published his first challenge to American psychology, Max Wertheimer (1880-1943) published a challenge to the established psychology of Germany (Hill, 1963). Both the American and the German versions were largely concerned with the structure of the mind. They tried to analyze conscious thought into fundamental units, such as sensations, ideas and images. In America there was a trend to study behavior for its own sake, but psychology was still considered primarily the study of conscious experience. Wertheimer (Hill, 1963) objected to the concern in psychology with analysis, that breaking consciousness into its parts destroyed what was most meaningful about it. Consciousness was his main concern; he wanted to study consciousness as it appears in wholes. This movement was primarily concerned with perception, but came to include learning and other topics as well. Wertheimer (Hill, 1963) applied the German word "Gestalt" to this emphasis on whole systems in which the parts are dynamically interrelated in such a way that the whole cannot be inferred from the parts taken separately.

Wolfgang Kohler and Kurt Koffka contributed to gestalt theory. Koehler's book, The Mentality of Apes (1925) and Koffka's The Growth of the Mind (1924) brought the gestalt doctrine vividly to the attention of American psychologists, and influenced American learning theories (Bower and Hilgard, 1981).

Gestalt psychologists were primarily interested in perception and in problem-solving processes. Gestalt psychology had a stimulating effect on the study of learning and memory. Its ideas about

human learning came to be appreciated and exploited in the early 1970s by scientists such as Allen Newell and Herbert Simon (Bower and Hilgard, 1981). The study of insight is the most important contribution of gestalt theory to our understanding of learning (Hill, 1963). Early German Gestalt Psychologists were the intellectual forefathers of much of what is today called cognitive psychology.

Among the gestalt psychologists who worked in Germany with Wertheimer, Kohler and Koffka was Kurt Lewin (1890-1947). Lewin outlined a system of description within which learning, personality, and social behavior could all be discussed. He introduced the concept of life space, which is defined as the totality of facts which determine the behavior of a given individual at a given time (Hill, 1963). Lewin's work provides a system for describing and predicting behavior, but does not espouse a definite theory of learning (Hill, 1963).

Edward Tolman (1886-1959) published Purposive Behavior in Animals and Men in 1932. Tolman created what has been called a purposive behaviorism, because it involves the study of behavior as it is organized around purposes. He attempted to combine behaviorism's objectivity with an appreciation of the cognitive aspects of bahavior (Hill, 1963). Tolman emphasized the relation of behavior to goals. Tolman combined the best of behaviorism and cognitive theory, although he did not do experiments to make these cognitive formulations precise enough to be really useful for prediction (Hill, 1963). His emphasis upon physical objectivity was a symptom of the readiness of psychology to receive a method in which the mind was

reduced to a reflex of the brain (Kimble, 1961). Tolman influenced the psychology of learning in basic, methodological ways. He was responsible for the first clear statement of the learning-performance distinction; he was one of the first to contend that conditioning is a limited form of learning; and he brought the concept of intervening variables to American psychology (Kimble, 1961).

William K. Estes (born 1919) contributed to the development of statistical learning theory (Hill, 1963). He was interested in building a mathematical model of learning. Estes constructed an abstract formal model of learning, emphasizing stimulus factors and de-emphasizing reinforcement (Hill, 1963).

Jean Piaget (1896-1983) studied the development of intelligence and concepts in children (Piaget, 1952). Piaget espoused the concept of mental development depending upon the idea that the world is made up of objects having substance and permanence. This "object concept" made possible the development of ideas of space and causality, and enabled the fundamental distinction between self and external world (White, 1968). In Piaget's system, the child comes at birth with certain sensory-motor coordinations which he termed schemata. Variations in stimulus situations calls for adaptive accommodations or changes in these schemata, of which these changes are assimilated or stored as residues. Piaget found incongruities between central schemata and receptor inputs to be facilitative of growth. In Piaget's theory the child's gestalt-like conceptions of reality are schemata which develop through a continuous process of accommodations and assimilations and become fixed or static only when the child's

schemata come to correspond so well with reality that no further accommodations are required (J. McV. Hunt, 1968). Piaget held that the development stages have a fixed order, and that each person passes through these stages in this order.

According to Hill (1963), cognitive psychology is now a dominant viewpoint in American experimental psychology. Cognitive theories suggest that perceptions determine what is learned; that learning involves reorganization and transfer to new situations; and that since humans are innately curious, learning by insight has its own rewards. Problem solving, creative thinking, discovery learning, divergent thinking, decision making, aesthetics, perceiving and questioning strategies may be attributed to the cognitive theory of learning. Further, cognitive theory results in the awareness of learning strategies in human beings that can apply as circumstances, motives and materials require (Bower and Hilgard, 1981). Differences in learning abilities among people, depending on the particular strategies or specific skills and knowledge acquired, is also recognized. Rudolf Arnheim, Soloman Asch, Kurt Goldstein, and Wolfgang Metzger are among those identified as strongly influenced by the cognitive theory.

Recent Developments in Learning Theory

Contemporary psychology witnessed an increasing convergence of the historically distinct theories of learning. Behaviorism now incorporates some of the phenomena associated with cognitivism:

sensory imagery, sensory conditioning, hypothesis learning, observational learning, decision making and biases in processing of information for learning (Bower and Hilgard, 1981).

Cognitive psychology is concerned with how organisms gain knowledge about the world and how they use that knowledge to guide decisions and perform effective actions. Cognitive psychologists try to understand the mind and its abilities in perception, learning, thinking and language use. Most cognitive psychologists follow an information-processing approach and view the human brain as a kind of computer, having distinct levels of organization, treatable as a symbol-manipulating system (Bower and Hilgard, 1981).

Learning is a fascinating interactive process, the product of teacher and student activity within a given learning environment. The process of learning is, in turn, subject to wide variation in sequence, style and quality. Experienced educators know that the quality of instruction is greatly influenced by the particular mix of student characteristics, teacher approach, and classroom organization (Keefe, 1979b).

According to Glenn Hass, there are at this time four major families of learning theory (1980): S-R conditioning, Freudian theory, social learning theory, and the field theories.

Stimulus-Response conditioning includes all the reinforcement and conditioning theories of learning. Experience is important, and thinking is a part of an S-R sequence that begins and ends outside the learner. Learning is a conditioning process by which a person

acquires a new response; motivation is the urge to act, resulting from a stimulus; and behavior is directed by stimuli from the environment.

Freudian learning theories include awareness, which is freedom or self-understanding; identification; and imitation. The importance of self-knowledge is a basic premise of Freudian psychology. Freudian learning theories are utilized freely and compatibly by the exponents of the S-R associationist, the perceptual-field, and cognitive-field learning positionists.

Social learning is emphasized by sociologists, anthropologists and social psychologists. According to this theory, human beings have unlimited capacity to learn, but this capacity is confined by social expectations and by limitations in behavior patterns that the immediate social environment considers appropriate. The learning environment is primarily social, and learning occurs through socialization. The dyadic relationship between two people is the basic unit of learning. In describing how learning occurs, social learning theorists make use of rewarded responses, transfer, self-concept, personal meaning, meaningfulness of the whole, the importance of generalizations and organization, self-understanding, imitation and identification.

Field theory includes the Gestalt-field, perceptual-field and cognitive-field group of learning theories. In these theories, wholeness is primary, starting with the total aspects of a learning situation and proceeding to the particulars in light of the whole.

The nature of the whole determines the meaning of the components; individual perceptions determine meaning.

Gestalt-field theory emphasizes wholeness, and means that field theories reject elemental analysis in terms of stimuli and responses as the most significant factors in learning (Hass, 1980). The meaning of learning can only be derived from the whole, not from its parts.

Perceptual-field psychology is "a humanistic, phenomenological, personalistic, existential view of behavior which sees man engaged in a continuous process of being and becoming (Combs, 1980:157)." The primary principle of perceptual psychology is that all behavior is a function of the behaver's perceptual field at the instant of behaving (Combs, 1980). Arthur Combs and Donald Snygg published the first outline for perceptual or experiential psychology in 1949 (Combs, 1982). Abraham Maslow called this movement "Third Force" psychology. Combs (1982) stated that people's belief systems determine behavior, and guide individual selection of appropriate behaviors for particular situations.

Cognitive-field learning theory emphasizes personal meaning, generalizations, principles, advance organizers, discovery learning, coding and superordinate categories. The self-concept is central, and behavior and learning are functions of perception. Meanings existing for the individual as a result of one's unique perceptions most affect learning, and the whole is greater than the sum of its parts.

Cognitive theorists (Bruner, 1959; Gagne, 1978; Ausubel, 1963) not only agree that the learner's acquisition of clear, stable and organized bodies of knowledge is the major, long-term objective of education, but also insist that these bodies of knowledge, once acquired, constitute the most significant independent variables in influencing the meaningful learning and retention of new subject-matter material (Ausubel, 1965).

Control over meaningful learning can be exercised effectively by identifying and manipulating significant cognitive structure variables. This can be done substantively, being concerned with the structure of a discipline, and programmatically, by employing principles of ordering the sequence of subject matter and its internal logic and organization (Ausubel, 1965).

Proponents of the cognitive viewpoint, including Gagne, Ausubel and Bruner, use perception as their model. They regard differentiated conscious experience as providing the most significant data for a science of psychology (Ausubel, 1965). Instead of focusing mechanistically on stimulus-response connections, they endeavor to discover psychological principles of organization and functioning governing these differentiated states of consciousness and the underlying cognitive processes from which they arise.

According to David Ausubel (1965), meaning is not an implicit response but a clearly articulated and precisely differentiated conscious experience that emerges when potentially meaningful signs, symbols, concepts or propositions are related to and incorporated within a given individual's cognitive structure on a nonarbitrary and

substantive basis. The acquisition of new meanings is held to be coextensive with meaningful learning. Ausbel's advance organizer helps the learner categorize and interrelate specific topics, and is based on the belief that an array of information is best learned by understanding how it fits together, what parts depend upon or support others, and how it is organized. New material in this sequence should never be introduced until all previous steps are thoroughly mastered (Ausubel, 1965).

Gagne and Bruner differed from Ausubel in their conception of the role of cognitive structure in transfer (Ausubel, 1965). This difference stems in part from their conception of the nature of knowledge as consisting of the capability of performing different classes of problem-solving tasks. In fostering transfer, Gagne focused on the learner's possession of the problem-solving capability. Bruner concentrated more on the deductive aspects of transfer, and emphasized generic learning because it can facilitate derivative problem solving, or the solution of problems that exemplify a more general proposition (Ausubel, 1965). Ausubel, on the other hand, viewed knowledge as a substantive phenomenon rather than as a problem-solving capability, and regarded the transfer functions of cognitive structure as applying more significantly to reception learning than to problem solving in the typical classroom situation.

Robert Gagne is an associationist trained in the verbal learning tradition (Bower and Hilgard, 1981). Gagne proposed hierarchies of

skills and rules in academic tasks, which include sequencing the training of some skills before others. A number of distinct types of learning are identified by Gagne, in order of increasing complexity. Gagne has found the hierarchical principle a useful one for moving from learning principles to the sequencing of instruction. Gagne and White (1978) posited that the effects of instruction are derived from the three-term relationship between instruction, memory structure and learning outcome. The processing of various forms of instruction by the learner initially results in the acquisition of new memory structures. These memory structures enable the learner to retain and transfer in terms of new performances.

Jerome Bruner is a cognitive psychologist, with primary interests in the development of mental abilities (Bower and Hilbard, 1981). Bruner believed that a theory of instruction is prescriptive and proposed rules for achieving knowledge or skill and provided techniques for measuring or evaluating outcomes. It is also normative, in that it sets goals to be achieved and deals with conditions for meeting them. He specified that a theory of instruction must encompass four features: predisposition to learn, structure and knowledge, sequence, and reinforcement. Bruner took the position that, with sufficient understanding of the structure of a field of knowledge, something anticipating the later, more advanced concepts can be taught appropriately at much earlier ages. He (1960:33) stated:

> Any subject can be taught effectively in some intellectually honest form to any child at any state of development.

Bruner was interested in cognitive development, originally stimulated by Piaget. He emphasized three modes of representation in a developmental sequence: the enactive, or learning through action; the iconic, based on representation through perceptual means; and the symbolic, enabling the translation of experience into words (Bower and Hilgard, 1981).

J. P. Guilford's studies in the area of human intelligence have influenced modern day learning theory. Guilford proposed that cognition means discovery, rediscovery or recognition, and memory means retention of what is cognized (1965). Guilford classified intellectual factors according to the basic kind of process or operation performed, including factors of cognition, memory, convergent thinking, divergent thinking, and evaluating; according to the kind of material or content involved, including figural, symbolic or semantic material; and according to product, including units, classes, relations, systems, transformations and implications. His model, called "structure of intellect," represents the modes of variation of the factors. Structure of intellect has implications for testing intellectual abilities in an effort to understand the intellectual resources of individuals.

Lawrence Kohlberg has developed the cognitive developmental approach proposed by John Dewey and Piaget. He utilized this approach as a foundation from which to teach moral education (Kohlberg, 1980). The approach is called cognitive because of the active thinking involved in moral issues and decisions. It is called developmental because the aims of moral education are viewed as movement through

moral stages. The moral stages identified by Kohlberg are: preconventional level; conventional level; and postconventional, autonomous or principled level. These moral stages are considered to be structured wholes, or organized systems of thought, forming an invariant sequence forward, and are hierarchical integrations. The stages are defined as responses to a set of verbal moral dilemmas classified according to an elaborate scoring scheme. Since moral reasoning clearly is reasoning, a person's logical stage puts a certain ceiling on the moral stage he can attain (Kohlberg, 1980). Kohlberg's approach makes possible democratic experience in moral and intellectual development.

The high visibility and readability of cognitive theorists like Bruner and Gagne, and the increased believability of the information-processing model accompanying the rise of computer technology, has added credence and importance to cognitive psychology. The intuitive psychology of scholars in other disciplines who have been involved in curriculum reform, especially mathematics and the sciences, is invariably cognitive. It is time to reexamine educational structures in light of what is appropriate for our time.

New Directions for Instruction

During recent years the importance of principles of learning in the design of instruction for the schools has been increasingly recognized. Continually deepened knowledge of human behavior and of the factors governing it have led to the need for the design of novel procedures for instruction. According to Gagne (1980), investigators

of learning have shifted from a connectionist view of learning, which held that learning is a matter of establishing connections between stimuli and responses, to an information-processing view, recognizing that stimuli are processed in a variety of ways by the central nervous system.

Gagne (1980) stated that the most desirable condition for new learning is the prior learning of prerequisite capabilities; this is dependent upon instruction, memory structure and learning outcome. He believed that diagnostic tests should be designed and used to measure prerequisite skills of learners; prerequisites not mastered must be taught; and additional practice should be in the form of periodic and spaced review. As new memory structures are acquired, the learner is enabled to retain and transfer in terms of new performances (Gagne and White, 1978). Gagne (1980) defined instruction as a matter of stimulating the use of capabilities the learner already has at his/her disposal, and making sure s/he has the requisite capabilities for the present learning task as well as for other tasks to come.

Robert Glasser (1977) stated that recent works in learning theory, developmental psychology, and psychometrics strongly suggest new directions for educational research and practice. He recommended that the deadening effects of uniformity need to be recognized, and that educational environments must be adapted to individual differences. Carleton Washburne made a similar statement in 1925:

> Throughout the educational world, there has . . . awakened the desire to find some way of adapting schools to the differing individuals who attend them.

Glasser (1977) recommended an adaptive mode of education, in which a wide range and variety of instructional methods and opportunities for success are provided. In an adaptive educational setting, alternative means of learning are adapted to and in some way matched to knowledge about each individual; an individual's styles and abilities are assessed and are related to subsequent learning experiences; and student learning experiences are matched with abilities and interests. Measures of individual differences are valid to the extent that they help to define alternate paths that result in optimizing immediate learning, as well as long term success. Glasser (1977:312) stated:

> In principle, and in contrast to traditional practice, there seems to be no reason why educational environments cannot be designed to accommodate more readily to variations in the backgrounds, cognitive processes, interests, styles, and other requirements of learners.

Current research indicates that a fruitful approach to education is the consideration of individual differences in terms of the process constructs of contemporary theories of learning, development and human performance.

Cognitive Processes Involved in Learning

An awareness of learning theory is important in order to understand the range of teaching styles needed to accommodate student learning styles that can be found in classrooms. There is ample evidence to demonstrate that cognitive processes involved in learning can be identified and influenced, and the analysis of individual differences in performance can be carried out in terms of such processes (Melton, 1967). Studies designed to experimentally

identify and influence cognitive processes have been conducted by innumerable researchers. William Rohwer (1970) studied the developmental and individual difference aspects of mental elaboration, in reference to the fact that individuals recode or transform materials presented to them by elaborating the content. Rohwer's work suggested that individual differences, related to students' backgrounds, influence the way in which they carry out cognitive processes of this kind. Rohwer (1970) suggested that children should be trained in elaboration of content in order to facilitate learning in general.

In another study related to individualization of instruction, Jerome Rosner (1972) studied perceptual processes related to basic academic tasks in elementary school. Rosner's work indicated that competence in visual and auditory perceptual processes, concerned with organizing and extracting patterns of information in geometric patterns and in sound combinations; is differentially related to academic achievement in math and reading. He has also demonstrated that these processes can be taught to children.

Studies such as these support the potential for research of individual differences in terms of cognitive processes. Kagan and Kogan (1970) systematically studied the effects of cultural background on the dominance of visual, auditory or tactile sense modalities; the ability to hold changing images in memory, or "leveling and sharpening;" and the degree to which an individual pauses to evaluate the quality of cognitive products in the course of problem solving, referred to as differences in reflection and impulsivity. They concluded that some people consistently reflect before responding,

while others make impulsive responses; this creates dramatic differences in quality of problem solving among individuals, with impulsive respondents making more errors than reflective individuals. Kagan and Kogan (1970) claimed that these traits are stable over time and applicable to various situations.

Other studies designed to identify and modify cognitive style were conducted by Yando and Kagan (1968) and Meichenbaum and Goodman (1969). Yando and Kagan found that when first grade students are placed with experienced teachers who have a reflective style, the children become more reflective during the school year than children who are placed with impulsive teachers. This study implied that tailoring the tempo of the teacher to the child can influence the child's behavior. Meichenbaum and Goodman (1969) investigated the controlling function of covert speech as a self-guidance procedure. In this system, impulsive children are taught to talk to themsleves in order to modify their problem-solving styles.

Educational systems need to present adaptive educational environments that enhance the abilities of individuals for self-regulation in different possible situations for learning. Glasser (1977:320) stated that "intelligence is specific to the particular ways in which school subjects can be learned." The kinds of educational systems that are most effective will be extracted from the fullest understanding of human behavior and from sustained, carefully studied educational innovations with the flexibility for successive incremental improvement. If we value individual performance, we must design

effective conditions under which individuals are provided with the opportunities and rewards to perform at their best and in their own learning styles.

Learning Styles

Individualization, based upon recognition and support of each student's own way of learning, is not adequately provided for in many classrooms. Current research by cognitive psychologists and educators produced information for teachers relative to individualization in classrooms. Many definitions of learning style exist, and much of the research has not been integrated or related. Continuous, in-depth development of understanding of the learning process should be a priority for educators. Information should be easily accessible to teachers. According to Adaia Shumsky (1968), having insight into the qualitative difference of the academic capabilities of children enables the teacher to provide individual children with an opportunity to use and develop their strongest avenues for learning.

The exact beginning of interest in learning styles cannot be pinpointed. Coop and Sigel (1971) reported that German psychologists discussed cognitive style at the turn of the century. A variety of work on personal learner characteristics was explored throughout the 1930s and during the 1950s in America. Gordon Allport used the term in 1937 to define aspects of a student's personality. Allport viewed learning style as a variable to be considered in an understanding of the learning process. According to Robinson (1974), Gardner was the first to use the term cognitive style in his studies in 1959.

In the 1960s Herman Witkin (1962) studied perception and defined two polarities: field-dependence and field-independence. He has since studied and applied perceptual characteristics to learning.

Educators during the 1960s and 1970s began to specifically speak of learning style. Studies and applications of learning style appeared: cognitive style mapping in Junior College; diagnosis and application to gifted students; patterns in learning of the learning disabled; career counseling based on analysis of style; and diagnosing style in relation to vocational education.

Bruce Joyce and Marsha Weil (1972) were, at this time, exploring teaching style. They identified several distinctive teaching styles and related them to student learning.

The literature refers to cognitive style and learning style and indicates that style may be equally as predictive of success as motivation or conceptual skills. Cognitive style is most frequently used by psychologists to define the various ways people perceive, think, process and learn. Learning style is most frequently used by educators to describe the various ways by which people learn.

Kinds of Learning Styles

According to Dunn and Dunn (1979), a body of knowledge accumulated over an eighty year period repeatedly verifies that students acquire information and skills in many different ways. What is unique is that the research on the information processing habits of learners has produced instrumentation that is useful in identifying specific learning styles, and has resulted in a new look at classroom

activities in the context of students' learning characteristics. Cognitive style and learning style may be classified as follows: cognitive processes, learner behaviors, combination of cognitive processes and learner behaviors, sensory modality styles, and other examples.

Cognitive Processes

The cognitive processes are inferred through specific behaviors exhibited by individuals, and include cognition and conceptualization. Herman Witkin (1976) defined cognitive styles as characteristic modes of functioning revealed throughout our perceptual and intellectual activities in a consistent and pervasive way. Witkin and his associates (Witkin, Oltman, Raskin, and Karp, 1971) explored perceptual characteristics among people in the late 1940s. Witkin's experiments led to the definition of two polarized indicators of the extent to which the surrounding field influence an individual's perception of an object within it. They concluded that an individual with a field-dependent mode of perception is dominated by the prevailing field; a person with a field-independent mode of perception experiences objects as more or less separate from the surrounding field. Field-independent people can separate and analyze parts from a whole; field-dependent people can work with the whole. The terms analytic and global are sometimes used to describe field-independent and field-dependent people. Witkin (1971) stated that most people are not extremely field-independent or field-dependent, but tend to be relatively one or the other.

Witkin, Goodenough and Oltman (1979) posited that these dimensions of orientation include the perceptual and intellectual domains, as well as domains of personality. Witkin (1971) defined cognitive styles as processes concerned with form rather than content of cognitive activity. They referred to individual differences in how people perceive, think, solvè problems, learn, relate to others, and so forth. Witkin (1971) developed the Embedded Figures Test to assess field-independence and field-dependence. He claimed that his nonverbal assessment instrument is free of cultural bias (1977). Witkin implied that people can be taught to compensate for their cognitive style weaknesses.

A great deal of research has been done to affirm and clarify field-independence and field-dependence characteristics in people. Rameriz and Castenada (Cortes, 1978) studied Chicano populations and use the term field-independence and field-sensitivity. They found that most Chicanos studied are predominantly field-sensitive because of their cultural environment, and suggested that the educational system must better accommodate this learning style.

Learner Behaviors

Learner behaviors include operational definitions of learning style, and include teacher-student interaction. Rita and Kenneth Dunn (1979) defined specific elements of the learning situation as the learner's style. They stated that learning style is an individual's preference for each of the eighteen different elements that they have identified as factors in learning. These elements are