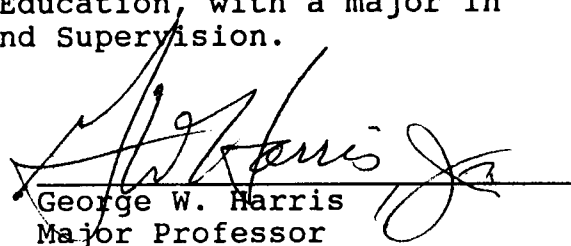
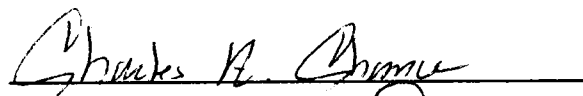
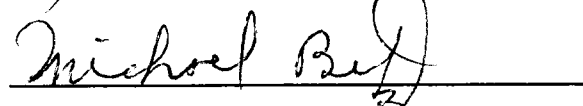


To the Graduate Council:

I am submitting herewith a dissertation written by Jacquelyn Osborne Murphy entitled "An Exploratory Study to Examine the Relationship Between Student and Teacher Perceptual Preference in Relation to Student Achievement in Reading in Grades Two, Three, Four, and Five of the Alcoa Public School District." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration and Supervision.


George W. Harris
Major Professor

We have read this dissertation
and recommend its acceptance:


Accepted for the Council:


Vice Provost and
Dean of The Graduate School

AN EXPLORATORY STUDY TO EXAMINE THE RELATIONSHIP
BETWEEN STUDENT AND TEACHER PERCEPTUAL PREFERENCE
IN RELATION TO STUDENT ACHIEVEMENT IN READING
IN GRADES TWO, THREE, FOUR, AND FIVE
OF THE ALCOA PUBLIC SCHOOL DISTRICT

A Dissertation
Presented for the
Doctor of Education
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Jacquelyn Osborne Murphy

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strength and commitment to my success inspired me when I was discouraged. I will always be indebted to them.

ABSTRACT

The primary purpose of this investigation was to examine the relationship of matches and mismatches between selected learning style characteristics of pupils and teachers in relation to student achievement in reading comprehension. The characteristics under investigation were perceptual preferences for tactual and kinesthetic stimuli. The study also examined the reading comprehension achievement between boys and girls, as well as reading comprehension achievement among grade levels. The relationship between perceptual preference and gender was also investigated. An additional purpose of the study was to determine if The Reading Styles Inventory and by The Gregorc Style Delineator had any elements in common.

Student data were collected from 120 subjects in grades two, three, four, and five from existing school records that included reading comprehension scores from the 1990 spring administration of The Stanford Achievement Test and reading style profiles from the fall 1989 administration of The Reading Styles Inventory. Both instruments were administered to students as part of their remedial reading program at Alcoa Elementary School during the 1989-90 school year.

Twenty-two state certified and state supported teachers were administered The Reading Styles Inventory to

identify perceptual preferences. They also completed The Gregorc Style Delineator to determine their dominant style of processing and ordering information.

No significant difference was found in the mean reading comprehension scores of those students whose perceptual preferences matched those of their teachers' perceptual preferences. A significant difference was found in the mean reading comprehension scores of boys and girls with girls scoring higher. No significant difference was found among the reading comprehension scores of students in grades two, three, four and five when grade level comparisons were made. No significant relationship between mean achievement scores among grade levels was found. Also, there was no significant relationship found between perceptual preference and gender of the respondents. Carbo's Reading Styles Inventory and Gregorc's Style Delineator instruments were found to have no elements in common.

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CHAPTER 1

INTRODUCTION

Most students, regardless of background, are capable of learning. Many, however, do not progress at the same pace or learn in the same ways. Individual learners approach academic tasks with different styles. Varying styles can mean that some individuals will be far more successful than others with particular tasks, including the task of learning to read.

Some students can learn to read with any method, but for others, the wrong method can make learning to read difficult or even impossible (Carbo, 1986, p. 49). Of the various solutions offered to facilitate the task of learning to read, one of the most promising has been the use of learning styles diagnosis and prescription in designing reading programs.

Teachers have been trying to increase reading ability for decades but despite professional experts, many innovations, and massive federal funding, both past and present reading programs have continued to produced a highly unacceptable and unnecessary number of children who read poorly (Hart, 1983). Between 1963 and 1980, reports from The College Board Scholastic Aptitude Tests (SAT) documented a virtually unbroken decline in overall

achievement among American high school students. According to Kintsch (1979), approximately, 25 percent of high school students had reading difficulties. Many 17-year-olds did not possess the higher intellectual skills required to attain literacy. Thirteen percent of all 17-year-olds in the United States were considered functionally illiterate (Anderson et al. 1985). Sixty-one percent of 17-year-olds failed to demonstrate the ability to find, understand, summarize, and explain relatively complicated information. Nearly 40 percent of our nation's 17-year-olds were unable to draw inferences from written material (National Assessment of Educational Progress, 1989).

In examination of reading achievement at other grade levels, tests of reading progress since 1970 showed little change for 13-year-olds and overall gains for 9-year-olds. It was reported however, that 6 percent of the 9-year-olds could not carry out simple reading tasks (National Assessment of Educational Progress, 1985).

According to the most National Assessment of Educational Progress, only 1.2 percent of 9-year olds, 10.8 percent of 13-year-olds, and 46.6 percent of 17-year-olds functioned at advanced levels (cited in Miklos, 1990). Dale Johnson, past president of The International Reading Association, stated that "[these percentages] indicate a real problem in terms of higher level reading that requires

inferencing and reasoning. In addition, he said, "If we value reading beyond the most rudimentary and basic levels, we have a serious problem on our hands."

International comparisons of students' achievement completed a decade ago, revealed that on nineteen academic tests American students were never first or second, and in comparison with other industrialized nations our students were last seven times (Anderson, 1985). Of the 159 members of the United Nations, the United States ranked 49th in its level of literacy (Larrick, 1987).

In the decade of the Nineties, some 23 million American adults were classified as functionally illiterate by the simplest tests of everyday reading, writing, and comprehension (Anderson, 1985). The incidence of illiteracy in the United States rose with an estimated 2.3 million adults annually joining the ranks of the functionally illiterate (Larrick, 1987).

Statement of the Problem

It was believed that children who experienced difficulty in school generally, and in learning to read specifically, did so because they were not being taught in ways that responded to how they learned. During the decade of the Eighties, educators were exhorted to consider and to provide for student individuality in learning rate and

style. Goodlad (1984) suggested that provisions for learning differences are not made in most schools:

Our data suggest that . . . students worked independently at all levels but primarily on identical tasks, rather than on a variety of activities designed to accommodate differences. In general, there were more different kinds of instructional activities in elementary than in secondary classrooms; elementary school teachers varied the group configurations in their classrooms from time to time and occasionally even changed the content of their methods of teaching. Secondary teachers rarely individualized classroom procedures. On the whole, teachers at all levels apparently did not know how to vary their instructional procedures, did not want to, or had some kind of difficulty doing so. (Goodlad, 1984, pp. 105-106)

In many cases, current approaches to instruction were believed to inhibit student learning by the erection of barriers inherent in those approaches. Examples of such barriers included tracking or ability grouping, testing, curriculum, educational policy, and teaching styles of individual teachers (National Coalition of Advocates for Students, 1986).

School structures that prescribed learning at the same pace in the same way for all students lacked flexibility. If a student needed more attention than others, or took longer to catch on to initial skills involved in reading, the student was likely to be tracked for failure, to be ignored and, to remain unserved.

The process and content of teaching and learning were thought to be at the heart of the educational experience.

The quality of the interactions between students, teachers and subject matter was thought to be the most important ingredient in the educational experience. Learning styles and teaching styles influenced the quality of the interactions. Unfortunately, these interactions often played themselves out in ways which discouraged, rather than encouraged.

Many teaching practices emphasized the passivity of the learner (Carbo, Dunn, & Dunn, 1986). Many teachers lectured or passed out worksheets. Many students listened or filled in blanks. Little interaction or engagement characterized the teaching approach. Many teachers were not reported to have designed learning activities to connect students with the structure and ways of thinking that characterize a field of inquiry. Many students were bored. They were overloaded with fragmented pieces of information which they were asked to memorize. Large numbers and wide diversity in children combined with rigid scheduling and an increasingly standardized curriculum left little or no opportunity for teachers to provide the individualized attention "at risk" students needed to be successful. The result was a lower quality of education for all students.

Basic changes were needed in the curriculum, in teaching practices, and in the organization and structure

of schools. Proposals for reform assumed that doses of old-fashioned medicines involving only policies and structure of schools would realize the goal of educational excellence. Some of the major problems with American education (as stated by policy makers at various levels), might have been remedied by a return to more traditional academic curricula; with an added measure of computer literacy; more standardized tests and course requirements; firm criteria for grade-to-grade promotion; and higher graduation standards.

All students should not have been expected to learn the same things under the same conditions. Schools should have taught all students, not just those who were able and willing to benefit from the standard curriculum presented in traditional teaching styles (Carbo, Dunn, & Dunn, 1986). Thus, each child should have been helped to develop his or her potential abilities to the greatest degree, based on evaluations of individual strengths, preferences and limitations and based on conscience efforts to match teaching and learning styles. Instructional approaches should have accounted for student differences by providing variety in the goals and objectives for study, the content considered, the materials and resources employed, the methods and techniques used, the settings of instruction utilized and the form of evaluation allowed. Classroom teachers were responsible for providing successful learning

experiences for all children in their classrooms, including the less able readers (Gaskins, 1988).

Summary

"Despite professional expertise, many innovations and massive federal funding, both past and present reading programs have produced highly unacceptable and unnecessary numbers of children who read poorly" (Hart, 1983). Many students who comprised this number experienced difficulty because they were not being taught in ways that responded to how they learned. Yet, while many students continued to fail to attain necessary skills in reading, diagnosis of individual learning characteristics and efforts to match teacher characteristics, methods, and materials to specific individual strengths were instructional strategies practiced by a limited number of teachers. A body of literature exists that suggests that student achievement in reading is greater when teaching methods and materials match student learning style (Dunn, Beaudry, & Klavos, 1989; Carbo, 1987). However, few studies have examined the match/mismatch of student and teacher perceptual preferences in relation to reading achievement.

Statement of the Purpose

The purpose of this study was to explore the relationship between selected reading style characteristics

of both students and teachers in relation to student achievement in reading comprehension. The reading style element under investigation was perceptual preference. The specific preferences were defined as tactile and kinesthetic. An additional purpose of the study was to examine The Reading Style Inventory and The Gregorc Style Delineator for common elements.

The study explored the questions:

1. Do students whose perceptual preferences match those of the reading teacher show greater achievement in reading comprehension than students whose perceptual preferences are mismatched with those of the reading teacher?
2. Is there a significant difference in the mean achievement scores in reading comprehension between boys and girls?
3. Is there a significant difference in the mean achievement scores in reading comprehension among students in grades 2, 3, 4 and 5?
4. Is there a significant relationship between perceptual preference and gender of the respondent?
5. Do The Reading Style Inventory and The Gregorc Style Delineator have elements in common?

In order to explore the questions set forth in this investigation, an exploratory design was employed. Twenty-two teachers were administered The Reading Style Inventory to identify their tactual and kinesthetic preferences. They also completed The Gregorc Style Delineator which determined their dominant styles of processing and ordering information. Student data were collected for 120 subjects in grades two, three, four, and five from existing school records that included individual Reading Style Profiles and reading comprehension scores. Student and teacher perceptual preferences were examined and determined to be matched or not matched. Mean reading achievement scores for students who were matched with their teachers were compared with scores of students who were not matched with their teachers. Student data were collected and analyzed to address the other questions in the study. The Reading Style Inventory and The Gregorc Style Delineator were examined for common elements.

Assumptions

The present investigation was conducted based on the following assumptions:

1. The learning of reading is of primary importance in the schooling process. Therefore, the assessment of factors involved in improving

reading instruction and achievement are goals for educators to achieve.

2. The use of achievement tests for the purpose of measuring student achievement is acceptable in educational research.
3. Subjects will respond to the best of their abilities and with honesty to the instruments administered.

Limitations

This study was limited to the measures provided by the instruments selected. The Reading Style Inventory, The Gregorc Style Delineator and The Stanford Achievement Test were selected because they were reliable, accessible, economical, and could be administered with little difficulty in a reasonable amount of time. In addition, the study was limited to the teachers and students at Alcoa Elementary School during the 1989-90 school year. The researcher might have desired to include subjects from several locations in the nation but time and financial resources were prohibitive.

Delimitations

This study was delimited by the choice of the researcher to examine only two of the twenty-three reading

style elements. It was further delimited by the selection of Chapter I students and state supported classroom teachers at Alcoa Elementary as subjects.

Importance of the Study

Increasing attention has been focused on the many functionally illiterate students who were awarded high school diplomas and then were pushed out into the job market only to be condemned to unemployment, marginal employment or welfare (Dunn, Dunn, & Price, 1977). In addition, there were some 26 million adult illiterates in the United States and the situation was reported to be getting worse (Carbo, 1987).

Elementary schools have been charged with the task of teaching every child to read. Schools that used and celebrated diversity in teaching styles, particularly in relation to reading instruction, created opportunities for all students to find their style accommodated at some time and in some classrooms. It was hoped that this study would challenge teachers to expand and vary their instructional strategies so that students might not only find their styles accommodated during reading instruction, but that they (students) might experience success.

It was hoped that this study would encourage administrators to seriously consider individual differences

among students and staff in building classes and in making student assignments to teachers for reading instruction. The teaching of reading was considered a responsibility to be undertaken with the expectation that every effort would be made to help students succeed.

Administrators, as instructional leaders, were challenged to actively use the diversity among staff in curriculum planning and in school wide decision making; in maintaining a balance of styles in staffing the school as a whole as well as in staffing individual departments and grade levels; and in planning for growth of individual teachers for the improvement of the total school program.

Definition of Terms

1. Abstract Random: An emotional, exuberant idealist. Psychic, perceptive, and critical.
2. Abstract Sequential: A serious, intellectual realist. Logical, analytical, and rational.
3. Auditory Modality: The sense having to do with hearing.
4. Chapter I: The largest federally funded elementary and secondary education program which provides funds for extra services such as remedial reading and math, needed by "educationally deprived", i.e., low-achieving students.

5. Comprehension: The understanding of a passage as measured by the number of correct responses to multiple choice questions.

6. Concrete Random: An inquisitive and independent realist/idealist. Intuitive, instinctive, and impulsive.

7. Concrete Sequential: A patient, conservative realist. Instinctive, methodical, and deliberate.

8. Kinesthetic Modality: The sense having to do with whole body movement and with real-life experiences. Kinesthetic learners must move about to produce the mental imprinting that helps them to focus on what needs to be learned.

9. Learning Style: The manner in which at least 23 different elements of five basic stimuli affect a person's ability to absorb and to retain information, values, facts or concepts (Dunn & Dunn, 1978).

10. Perceptual Modality: Any of the sensory channels through which an individual receives and retains information (Barbe & Swassing, 1979).

11. Perceptual Preference: The way in which a youngster prefers or likes to learn. For the purposes of this investigation perceptual preference refers to the tactile and kinesthetic modalities.

12. Reading Style: An individual's learning style when he/she reads (Carbo, 1984).

13. Tactile Modality: The sense having to do with touching and manipulating items with one's hands. Students who are tactile use their fingers and hands while concentrating.

14. Teaching Style: A set of attitudes and actions that influence student access to learning procedures, processes, and products (Butler, 1984).

15. Visual Modality: The sense having to do with seeing. Visual learners remember what they see and can retrieve details and events by concentrating on the things they have seen.

Organization of the Study

Chapter 1 presented an introduction to the study including the following: (1) a presentation of the problem, (2) a statement of the purpose, (3) an explanation of the need for such a study, (4) a list of assumptions, limitations, delimitations, and definitions.

Chapter 2 presents a review of literature related to the topic. This includes research on skilled and less skilled readers, research on gender differences and reading achievement, research on teaching styles and research on learning styles.

Chapter 3 presents the methods and procedures. It includes the research questions, a description of the

subjects, information about the instruments, details of the procedures, and data analysis.

Chapter 4 presents the findings and includes tables, figures, and graphic representations of accumulated data.

Chapter 5 presents the discussion, a summary, conclusions, and recommendations for future study.

CHAPTER 2

REVIEW OF LITERATURE

Research on Skilled and Less Skilled Readers

Reading has been defined as a process in which an active and strategic reader gains meaning through an interaction between background knowledge and information in a text. It has also been defined as a process in which readers intentionally employ various strategies to build understanding (Gaskins, 1988)

Research in reading has shown that the elementary grades are critical in determining future school achievement. If a child was reading poorly or not at all by the fourth grade, the chances of turning the child's progress around were found to be increasingly small (Chall, 1984).

Educational researchers have identified several significant differences between skilled and less skilled readers that may lead to better instruction in reading. One major factor that appeared to be critical in learning to read was the development of reading strategies. Two related factors underlying the development of strategic reading were: (1) knowledge about factors that affect reading and (2) control over reading strategies. Knowledge

about text and text variables were examples of factors fundamental to advanced comprehension.

Proficient readers were found to take into account such factors as text features, task demands and personal characteristics and adjust their reading accordingly. Good readers understood how different reading goals and various kinds of texts require particular strategies. Good readers knew that there were different kinds of texts, such as exposition, narration and fiction, and that many factors contribute to text difficulty (Adams, 1990).

Generally, beginning and poor readers had little knowledge of reading strategies and text variables. Less skilled readers showed little awareness that different purposes might have required different strategies (Myers & Paris, 1978). Interviews with children regarding the concept of reading revealed that less skilled readers believed the task of reading was completed once the words are decoded. They often limited their attention to decoding or reading sentences as isolated strings of words. They failed to elaborate the meaning of the text or to infer new information (Canney & Winograd, 1983).

Because less skilled readers were found to be unaware of the structure of stories and the clues that signaled text structure such as topic sentences and heading, they had considerable difficulty in picking out the most

important information in some passages (Yussen et al., 1980).

Poor readers presented a special challenge to the classroom teacher. It would have been a far easier task to teach them if their only difficulties had lain in decoding and comprehending the written word. However, along with reading difficulties, poor readers exhibited a number of behavioral, cognitive, and emotional problems (Gaskins, 1984; Meyers & Hammill, 1976). Often they experienced difficulty in such areas as initiating or completing tasks, working accurately, maintaining concentration, following written and oral directions, and staying in their seats.

Research on Gender Differences and Reading Achievement

It was generally accepted as fact that elementary, especially primary, aged males experienced a greater prevalence of difficulty in learning to read than did their female counterparts. This conclusion was reached by numerous researchers, but most convincingly in a comprehensive study undertaken throughout the National Assessment of Educational Progress (1990). Results revealed gender differences favoring females, who outperformed their male counterparts in each of the five NAEP reading assessments conducted from 1971 to 1988. The reading proficiency of males trailed that of females at all

three age levels, nine, thirteen, and seventeen, with the gap narrowing slightly among older students.

The idea that gender differences existed in reading at the elementary level gained support from Gates's (1961) study. Gates analyzed the reading achievement of 13,114 students in grades two through eight on three Gates's Reading Survey Tests: Speed of Reading, Reading Vocabulary and Level of Comprehension. His finding indicated that girls significantly outperformed boys on all three tests in every grade except second grade. Gates (1961, p. 431) stated that his findings "strongly confirm . . . that on the average girls' reading abilities excel boys."

In a later study (Sabers, Cushing, & Sabers, 1987) that compared the reading performance of boys and girls in grades five through eight, differences between the sexes on achievement measures of reading objectives were found. Girls scored higher than boys across most of the objectives, and especially on objectives measuring higher order thinking skills.

In an investigation (Hogrebe, Nist, & Newman, 1985) that examined the relation of gender to reading achievement at the high school level, results indicated that gender differences in reading achievement were very small. Gender failed to account for even 1 percent of the variance in reading achievement at either the senior or sophomore

levels. In general, girls performed higher than boys in most school subject which emphasize verbal skills including reading (Maccoby, 1966; NAEP, 1972, 1976).

Various hypotheses were postulated in an effort to explain why girls read better than boys. Explanations for the discrepancies between male and female reading achievement fell into two categories, not necessarily mutually exclusive: physiological-maturational and cultural-societal (Blom, 1976). One common explanation was based on the differing rates of maturation between boys and girls. This hypothesis was difficult to substantiate because the term maturation was frequently not specific or operational, making it almost meaningless. Another explanation suggested that gender differences in reading were actually differences in perception and cognition. Harris (1976) theorized from differences in brain lateralization that females showed more equivalence of language functioning between hemispheres, while males tended to be more asymmetric.

Restak (1979a) and Rose (1977) provided further evidence of sex-linked characteristics in brain functioning. Restak (1979a) reported that nursery school and preschool aged boys performed with greater success than girls of the same age on visual imagery tasks. His (Restak) studies of brain functioning indicated that boys

consistently activated the right hemisphere of the brain and girls more frequently activated both hemispheres while attempting to complete tasks. When findings of the infant and preschool studies were extended to the first grade level, Rose (1977) reported that male subjects performed tasks of visual discrimination, visual memory, and visual imagery at a level significantly superior to female subjects. Girls, meanwhile, performed tasks of auditory memory and auditory imagery at a level which was superior to the functioning of the male subjects. These researchers (Harris, Restak, & Rose) agree that the male brain seems to be more visually oriented and learns through active manipulation of the learning environment.

McGuinness and Pribians (1979) suggested that boys are more active and impulsive and superior in exploratory and manipulative action, while girls focus on communication. Many classrooms and many academic tasks demanded a great deal of attentive listening accompanied by long periods of quiet sitting. Thus, it was conclude that the listening and auditory language activities that are critical parts of many academic tasks tended to be geared more toward the neurological processing abilities of girls.

Gates (1961) concluded that a "feminized" school environment, which better met the needs of girls, was responsible for differences in reading skill between boys

and girls. This rationale for boys' lack of achievement was supported by Steninen, Stein, & Newman (1981) who found that in the United States, young boys apparently perceived reading as a feminine activity. Mazurkiewicz (1960) and Cassidy (1981) found that boys and their fathers viewed reading as a feminine task. This explanation inferred that differences in reading achievement were the results of social conditioning and sex role expectations. This culturally based hypothesis was reportedly becoming the most widely accepted explanation for gender-related differences in reading achievement.

Research on Teaching Styles

The process and content of teaching and learning were thought to be at the center of the educational experience. The most important ingredient in educational experience was considered to be the quality of interactions between student, teachers, and subject matter. Teachers were individually held accountable for the quality of each interaction with each child. Teaching styles and learning styles played a part in influencing the quality of the interactions. In fact, the actions and attitudes of teachers often determined the classroom climate in which students received a superior or inferior education.

Just as learners were found to have their own styles and their own sets of distinctive behaviors (which serve as indicators of how they learn from and adapt to their environment), so were teachers found to have their distinctive teaching styles. Kathleen Butler offered a comprehensive definition of teaching style:

Teaching style is a set of attitudes and actions that open a formal and informal world of learning to students. It is a subtle force that influences student access to learning procedures, processes, and products. The powerful force of the teacher's attitude toward students as well as the instructional activities used by the teacher shape the learning/teaching experience and require of the teacher and student certain mediation abilities and capacities. Thus, the manner in which teachers present themselves as human beings and receive learners as human beings is as influential upon the students' lives and learning as the daily activities in the classroom. (Butler, 1984, pp. 51-52)

The personality of each individual and unique teacher was reflected in his or her professional behavior. Differences were seen in the ways teachers related to students, structure and manage (their) classrooms and set the mood and tone for learning in those classrooms. Teachers varied in their priorities, in their expectations for student work, and in their strategies for evaluation of student learning.

Differences were seen in the methods and materials teachers used to help students learn and in curriculum interests and emphases. Instructional modes often included

recitations and lecture, discussion, inquiry, or role-playing (Hyman, 1970). Joyce and Weil (1972) used a more human relations type of approach in offering four broad categories of teaching models: (1) social interaction; (2) information processing; (3) personal source; and (4) behavior modification.

The classroom was described as a social system in which children and teachers interacted to enhance learning outcomes. According to Hunt (1971), it was important to find the optimum match between characteristics of children and the educational setting which included the personal characteristics of teachers. Some research noted that interpersonal attraction was higher between teachers and students with similar cognitive styles. The match of pupil to teacher cognitive style was found to foster optimum learning, because this variable seemed to have a definite impact on a teacher's way of teaching and the students way of learning. The "match" in cognitive style, according to Witkin (1976) helped individuals to have a better relationship because of shared foci of interest, shared personal characteristics and similarity of communication.

In the latter half of the 1940s, Witkin and his associates began exploring distinctive perceptual characteristics among people. They were interested in knowing to what extent a person's perception of an item was

influenced by the context ("fields") in which it appeared. Two extreme indicators of the extent to which the surrounding organized field influences an observers perception of an item within it were defined as field dependent and field independent. A person with a field dependent mode of perception tended to be strongly influenced by the prevailing field, while the field independent person experiences items as more, less or separate from the surrounding field.

Field dependency, originally labeled cognitive style, was linked to learning, teaching and many other behaviors. In offering advice to educators for responding to cognitive style differences, Witkin urged individuals to consider the advantages of both matching and mismatching styles. He (Witkin) pointed out that "the development of greater diversity in behaviors within individuals seemed as important an objective as the recognition and the utilization of diversity among individuals" (Witkin, 1977, p. 53).

Witkin stated that the styles of teachers could be categorized as either field dependent or field independent.

Field dependent individuals tended to have strong interests in people and social affairs. They tended to emphasize social goals. Teachers who were field dependent usually preferred teaching situations that allow

interaction and discussion with students. They were found to be student-centered and were particularly strong in establishing a warm and personal learning environment, emphasizing personal aspects of instruction. Questions were used to check on student learning following instruction. Little feedback was provided and negative evaluation was avoided. Field independents tended to be more detached, more impersonal and more oriented toward striving. Academic goals were their major focus. Teachers who were field independent tended to prefer impersonal teaching methods such as lecture and problem solving. They were more teacher-centered and strong in organizing and guiding student learning, emphasizing cognitive aspects of instruction. Questions were used to introduce topics and followed student answers. Specific corrective feedback was given and negative evaluation was used.

Olivia Saracho (1980) investigated the match of cognitive style, field dependent and field independent dimensions between teachers and students. Students were ranked by their teachers based on their judgment of student academic competence in the coming school year. Her (Saracho) study found that field dependent teachers tended to underestimate mismatched children more often than did field independent teachers. This finding was considered

important in relation to the impact of teacher expectations on pupil achievement.

Teacher expectations have the potential to generate self-fulfilling prophecies. If teachers expect certain children to improve their academic performance, those children might indeed perform well; obversely, if teachers expect children not to perform well academically, those children did not perform well (Rosenthal & Jacobson, 1968). (Teacher expectation was defined as an estimate of the child's probable academic performance within the classroom.) Teacher expectations of children were influenced by many factors, one of which was the cognitive style of both the teacher and the student.

Ultimately, knowledge of field dependence/independence was found to contribute to teachers' and students' abilities to use their own style strengths and then to develop more diverse strategies to facilitate success in learning.

Harvey, Hunt, and Schroder (1963) contributed a theory which described individual differences in information processing capacity. They focused on the ability of individuals to differentiate stimuli and to integrate information as it was received. The authors also stated that differentiation and integration capabilities were unitary in the sense that persons who were better able to

differentiate were also better able to integrate. The most capable differentiators and integrators were characterized by more complex and flexible conceptual structures. The least flexible individuals attempted to maintain their existing cognitive structure. They ignored or distorted information which did not fit into that structure. Persons with more flexible and complex structures were able to retrieve information which did not fit into their present categories and modified their conceptual structure in order to integrate the aforementioned facts.

In several studies regarding teaching, it was established that variety in teaching styles was a function of complexity of conceptual level. In addition, teachers displaying more complex conceptual structure had a greater ability to acquire new approaches to teaching and were able to integrate these items into their ongoing styles.

Another way of characterizing teaching styles was in dichotomous terms, i.e., the direct and indirect teaching styles and variations of the traditional and progressive styles (Minuchin, 1969; Westbury & Bellack, 1971). Much of the research on the direct/indirect dichotomy was based on Flanders' work. Flanders (1967) postulated that pupil learning was affected by teacher influence in the classroom and that this influence was established through the

teacher's verbal behavior. He defined direct and indirect influence as:

Direct influence . . . consists of stating the teacher's own opinions or ideas, directing the pupil's action, criticizing his or her behavior, or justifying the teacher's authority or use of that authority.

Indirect influence . . . consists of soliciting the opinions or ideas, praising or encouraging the participation of pupils, or clarifying and accepting their feelings. (Flanders, 1967, p. 217)

Flanders (1970) using the Flanders Interactive Analysis Categories (FIAC) examined the amount and quality of teacher and student talk in the classroom. He (Flanders) believed that there was too much teacher talk and not enough student talk in most classrooms, so that teachers should have been more "indirect", should have done more questioning and less lecturing, and in particular, should have more often accepted, praised, and made instructional use of the ideas and feelings expressed by their students. Flanders was primarily interested in the effects of teacher "indirectness" on student attitudes (liking for the teacher and the class). Flanders also included measures of adjusted student achievement in five studies conducted between 1959 and 1967. In Analyzing Teacher Behavior (Flanders, 1970), he reviewed his own work and that of others who had used the FIAC to link teacher-student interaction to student attitudes and/or

achievement. The data did not support the notion that teachers talked beyond what was necessary. In fact, in all five studies, teacher talk correlated positively with both achievement and attitude.

With respect to academic learning, some research findings tended to support the superiority of the indirect style. Samph (1974) found that language development and overall achievement of sixth graders was greater for pupils exposed to an indirect teaching style. Similar results have been reported for junior high school students in mathematics, social studies, and language arts (Flanders, 1970).

Not all the evidence supported the effectiveness of the indirect teaching style, however. Several researchers report that "indirectness" was unrelated to pupil achievement, especially in the lower grades (Allen 1970; Soar 1976). From the work of Soar, came an attempt to assess the effectiveness of direct/indirect teaching styles on the achievement of fifty-five classrooms of third through sixth grade students. On three measures of pupil growth (reading comprehension, vocabulary, and creativity), there was no clear evidence in favor of either direct or indirect styles. He (Soar) hypothesized that the level of thinking/reasoning required in different learning tasks was related to different optimum levels of indirectness. Soar

also suggested that an upper limit to the degree of indirectness existed that was associated with pupil gains, and beyond that point, pupils actually learned less rather than more. Reanalysis of the original data confirmed the hypothesis. On the basis of this study and others, Soar postulated the generalization that a single teaching style was not appropriate for all learning tasks, and that the optimum level for each style differs depending upon the nature of the learning task.

Some considered that the most thorough and systematic study of traditional versus progressive dichotomies was that of Bennett's (1976) work with the formal and informal dimensions. Using definitions of "tradition" and "progressive," Bennett broke the concepts down into their composite elements which then formed the content of a questionnaire given to a large representative sample of teachers. The result was twelve teaching styles which depicted various points on the formal and informal continuum. Bennett described the two styles at the ends of the continuum as follows:

"Informal Style: These teachers favor integration of subject matter, and unlike most other groups, allow pupil choice of work, whether undertaken individually or in groups. Most teachers will allow the pupils a choice of seating. Less than half of teachers curb movement and talking. Assessment in all its forms--tests, grading, and homework--appears to be discouraged. Intrinsic motivation is favored.

Formal Style: None (teachers) favor an integrated approach. Subjects are taught separately by class teaching and individual work. None allow pupils choice of seating, and every teacher curbs movement and talk. These teachers are above average on all assessment procedures, and extrinsic motivation predominates. (Bennett, 1976, p. 47)

Styles within the continuum differed in modes of instructional delivery, in the amount of movement and talk permitted, and in the assessment of student work.

Instructional deliveries included integration of subject matter, whole class teaching, group work, and teaching of separate subjects. The amount of movement and talk permitted varied from one teaching style to another. Some teachers allowed students to choose their seats while some assigned seats. Some teachers exercised low control allowing freedom of movement while others curbed movement and talking in various degrees. Some teachers assessed with regular testing and homework while others elected to eliminate formal testing practices.

Selecting a sample of third- and fourth-year primary teachers which reflected each of the twelve styles, Bennett followed the progress of their students for one year. His (Bennett's) results revealed that pupils taught by formal styles, and in some cases mixed styles, made greater progress than those taught by informal styles. With a few exceptions, noticeably in reading, gains were consistent across pupil achievement levels.

Bennett's work supported the effectiveness of formal styles. But the work of Flanders (1970) and Soar (1968) suggested that broad generalizations were inappropriate; that the effectiveness of a particular style depended upon time factors, the flexibility of the teachers, and the nature of the learning tasks.

Gregorc (1982) examined the notion of individual differences from another perspective. He (Gregorc) believed that the style reflected in an adult's behavior was an indication of the qualities of the human mind. Gregorc also identified style patterns in the context of total view of life which he called the "Organon System." The Organon System was an organized viewpoint of how and why the human mind functions and manifests itself through the human personality. Two mediation abilities of the mind, perception and ordering were studied. Gregorc described perception in terms of a continuum with opposite ends which he identified as abstract and concrete. Abstract perception described the tendency of the mind to "see" things in a mental, symbolic, intuitive, and emotional way. Concrete perception referred to the mind's tendency to "see" things in a realistic, direct, physical way. Many individuals were capable of using abstract and concrete perception, but each specific person had a tendency to prefer one over the other.

The mind also exhibited an ability to process information, knowledge and concepts. It (the mind) may have ordered things in a linear fashion, using a step-by-step method and at other times processed items in a nonlinear, tangential and leaping way. These two kinds of ordering or processing, sequential or random, formed opposite ends of a continuum.

Combining both perception and ordering, Gregorc identified four distinct patterns of style, Concrete Sequential (CS), Abstract Sequential (AS), Concrete Random (CR), and Abstract Random (AR). A teacher who preferred concrete perception and sequential ordering tended to use hands-on learning experiences, plan fieldtrips, enjoy projects, and have a variety of manipulative materials available in the classroom. The CS teacher appreciated specific order and routines and tended to manage the classroom in a structured and logical way. These teachers had special abilities to make school practical, realistic, predictable and secure for students.

When a teacher perceived in an abstract way and then ordered sequentially, he or she was described as having an Abstract Sequential teaching style. Teachers who preferred this style tended to apply their logical and sequential reasoning to abstract ideas, symbols, theories, and concepts. They tended also to encourage students to be

analytical, to evaluate what they were learning, and to supported their ideas with logical evidence and data.

When a teacher perceived in an abstract way but then ordered randomly, he or she was found to have an Abstract Random teaching style. Teachers who preferred this style relied on personal understanding of curriculum and content. They focused on individual students, their interests, and their needs, and they designed the classroom experiences in a very child-centered way. AR teachers usually responded perceptively to the moods and tones of the class and behave spontaneously when something was of interest to the students or to themselves. They enjoyed artistic and creative activities, projects, and materials.

When a teacher perceived in a concrete way and ordered randomly, he or she was found to have a Concrete Random teaching style. Teachers who preferred this style emphasized practical, realistic work but wanted it expressed in original and creative ways. They encouraged students to invent and solve problems by producing products that were both useful and original. These teachers tended to be active, enthusiastic, flexible, and spontaneous in the classroom. In addition, they were resourceful, used a variety of methods, changed often, and promoted active student involvement. These teachers "challenge[d] students to move beyond given knowledge and traditional learning to

discover new ideas and products for themselves" (Butler, 1984, p. 107).

In the examination of teaching styles, Dunn and Dunn (1977) identified teaching style characteristics that they believed to be generally associated with selected instructional programs. (For purposes of clarification, it is noted that the instruments designed by Dunn and Dunn and the instrument designed by Gregorc are independent of each other. One of the questions explored in the current study will examine the instruments for common elements.) The instructional programs included traditional classrooms, open classrooms, alternative programs, and individualized classrooms.

Teachers in traditional classrooms were responsible for helping students achieve minimal grade-level standards. They were generally whole-class lesson oriented and tended to dominate instruction with structured and directive methods. They were primarily concerned with how much students knew and were often unaware of individual physical needs. Teachers in traditional classrooms usually employed rigid and traditional physical arrangements that included assigned seats for students. Lesson plans tended to be scheduled with emphasis on sequenced material that had to be covered.

In open classrooms, teachers were responsible for providing an environment rich in multimedia resources and for encouraging student involvement with the materials. Multiple resources were provided permitting wide options for students to learn as they choose. Many varied, continuing, interactive learning activities were included in the curriculum. Teachers in open classrooms believed that students wanted to learn and will study as much as they are able.

In alternative programs, teachers believed in student selection of objectives and procedures. Opportunities for independent study, individual or small group assignments, and other self-instructional and reinforcement procedures and materials were provided. Teachers served as resource persons or guides as students develop self-reliance through consultation. Teachers supervised self-evaluation by students.

Teachers were responsible for diagnosing, prescribing for and guiding each student through the learning process in individualized classrooms. Multimedia, multisensory resources were available to students, who selected among them. Teachers served as managers of the teaching learning process and were flexible and guiding with some students. Teachers may have been directive and authoritarian with others.

Dunn and Dunn (1977) have argued that both students and teachers should be placed in appropriate instructional programs--programs that provide opportunities for teaching and learning in an educational environment that allows them to function according to the strengths revealed in each individual's teaching or learning style diagnosis (Dunn & Dunn, 1977).

No best way was found to teach. There were many different approaches, some of which were effective with some children and ineffective with others. Each youngster learned differently from every other one and it was decided that the match between how the learner learns and the teaching method that determines who learns what and how much (Carbo, 1986, p. 1).

Research on Learning Styles

Learning styles have been defined as, "the cognitive, affective, and physiological traits that have served as relatively stable indicators of how learners perceived, interacted with, and responded to learning environments" (Keefe, 1979, p. 4). Within teaching-learning interactions, an effort to assess learning style reflected a receiver orientation and recognized that students differed in their preference for and ability to process various kinds of instructional messages. Style elements

may have been conditions under which an individual preferred to learn or factors which must be considered to understand how information will be decoded and stored. They referred to cognitive processing, affective or motivational orientations, perceptual modality strengths, or structural environmental concerns.

History

Cognitive styles first emerged from concern about the effect of personality factors on cognition. Early references to style were made by the Greek physician Hippocrates when he identified Sanguine, Choleric, Melancholy and Phlegmatic personalities.

At the turn of the century, Carl Jung and other German psychologists began to explore individual cognitive differences. He (Jung) proposed that to understand different behaviors, we should focus on the basic functions people perform in their lives. He said that every psychologically healthy human being operated in a variety of different ways depending on the circumstances, the people, and the situations. However, in spite of situational adaptations, individuals inevitably tended to develop comfortable patterns that led to behave in certain predictable ways (Jung, [1921] 1971).

The term "cognitive style" was coined by American psychologist Gordon W. Allport to refer to a quality of living and adapting influenced by distinctive personality types. Since then more than twenty dimensions of cognitive style have been derived from experimental research (Allport, [1937] 1961).

The 1940s saw the development of the Myers-Briggs Type Indicator (MBTI), an instrument that would permit people to learn about their own type. Through forced-choice questions and word pairs, people are able to measure their own balance of intuition versus sensation, of thinking versus feeling, of extraversion versus introversion and of perception versus judgement (Guild & Garger, 1985).

Specific research on cognitive styles was greatly expanded after World War II at Brooklyn College, the Menninger Foundation, and the Fels Institute. Asch and Witkin (1948) at Brooklyn College worked with the bipolar trait of "field dependence-independence," the ability of a person to identify a figure against a background field (Keefe 1979). Gardner, Holtzman, and others at the Menninger Foundation identified a group of cognitive control factors: (1) differentiation vs. undifferentiation; (2) leveling vs. sharpening; (3) equivalence range; (4) tolerance for unrealistic

experiences; and (5) flexible vs. constructed control (Gardner et al., 1959). The Menninger group concentrated on cognitive style as a complexus of cognitive controls. At the Fel Institute, Kagan and his colleagues focused on analytic styles of thinking and problem solving (Kagan & Wright, 1963).

The consideration of cognitive style has widened since 1960 to include selection strategies (scanning and focusing), open/closed mindedness, memory or retention styles, risk taking vs. cautiousness, and sensory modality preferences.

Current efforts to explain the underlying processes of learning and teaching reflected two lines of research. One was concerned with applied models of learning style that focus on the multi-dimensional implications of learning style. Interview techniques or self-report questionnaires were utilized to allow students to identify their own perceptions of their characteristic traits. The other line of research retained a strong preference for the cognitive style dimension that focused on information processing.

Differences Between Learning Styles and Cognitive Styles

Frequently, distinctions have been made between learning styles and cognitive styles. The distinctions

between the two have tended to be arbitrary. What has been called learning styles has encompassed cognitive styles, and cognitive styles have constituted learning styles. Learning style constructs, however, have tended to be much more classroom oriented, more instruction- oriented, than have traditional cognitive styles. Unlike cognitive styles, which had been studied in and applied to a broad variety of conditions outside schools, learning styles were almost always identified with schools and in instructional contexts.

Another way that learning styles were differentiated from cognitive styles was that they (at least most of them), were more oriented to environmental events. While cognitive-styles researchers studied the ways in which individuals responded to their environments, learning-styles researchers were more likely to study the ways that environments affected the individual. Cognitive-style researchers usually studied a particular cognitive style in depth to the exclusion of others, while learning-style researchers were often found to concern themselves with large numbers of stylistic variables and their interrelationships.

Learning styles were specifically studied for the purpose of improving instruction. The study of cognitive styles was typically carried out for descriptive purposes,

i.e., to understand the individual, while learning styles were usually studied prescriptively, i.e., to determine how best to help that individual succeed in school. Research into learning styles was suggested as a way to make decisions about what students would learn and which methods would most effectively accomplish the desired outcomes (Holland, 1982).

Dimensions of Learning Styles

Learning style was conceived of in three dimensions: (1) cognitive style, (2) affective style, and (3) physiological style. Cognitive styles were described as information processing habits; affective styles were defined as motivational processes; and physiological styles were characterized as biologically based response modes.

Cognition, both as a term and as an area of study, concerned itself with knowing and knowledge, that was, in the sense of our knowing what goes on, both about and within us, and the implications of our knowledge for behavior. Cognition stood for those hypothetical psychological processes invoked to explain overt verbal and motor behavior as well as certain physiological reactions. The cognitive process was a subordinate term subsuming the more familiar titles of imagery, perception, free association, thought, mediation, proliferation of

hypotheses, reasoning, reflection and problem solving.
(Kagan & Kogan, 1970).

Each learner was determined to have preferred ways of perception, organization, and retention that were distinctive and consistent. These characteristic differences were called cognitive styles.

Cognitive styles were constructs that helped to explain the ways that personality differences influenced cognition and, through cognition, influenced behavior. Kogan (1980) defined cognitive styles as reflections of individual variations in modes of attending, perceiving, remembering and thinking. They (cognitive styles) represented an interface between cognition and personality. Holland (1982) described them (cognitive styles) as traits that were enduring, consistent characteristics that manifest themselves across a variety of behaviors and situations. A particular cognitive style meant that the individual would consistently perceive, think, and remember in certain ways under most circumstances. Messick (1969) conceived of cognitive styles as information processing habits represented the learner's typical mode of perceiving, thinking, problem solving, and remembering.

Numerous dimensions of cognitive styles were derived from experimental research. It was possible to organize the style dimensions in a general way as they touch on

either reception or concept formation and retention. Reception styles were concerned with the perception and analysis of data. Concept formation and retention styles dealt with hypothesis generation, problem solving and memory processing.

Reception styles. Reception styles included: (1) perceptual modality preferences; (2) field independence and field dependence; (3) scanning and focusing; (4) constricted and flexible control; (5) tolerance for unrealistic experience; (6) strong and weak automatization; and (7) conceptual and perceptual dominance.

Perceptual modality preferences relied on one of the three sensory modes of understanding experience. The three modes were kinesthetic or psychomotor, visual or spatial, and auditory or verbal. A number of children's preferences tended to be kinesthetic, moving to visual and eventually verbal in later years. In adults, all three modes functioned cooperatively, though a preference for one mode is usually evident (Sperry, 1975).

Field independence vs. dependence was a variable which was thought to determine a person's mode of remembering and perceiving. It also described analytical as opposed to global ways of experiencing the environment. Field independent persons were able to abstract an item from the surrounding field and to solve problems which include some

critical element out of context. Field dependents were guided by the organization or the field as a whole (Witkin, 1977). The style's implication for reading comprehension was that the more analytical, field-independent person should have comprehended better than the more global, field-dependent reader, because the field independent person should have been more able to deduce meaning. Recent research by Spiro and Tirre (1980) with college students lent credence to this hypothesis. The investigators found that field-independent readers tended to comprehend better because they used prior knowledge more effectively.

Scanning and focusing, originally defined in terms of the extent to which an individual attempted to validate the judgements made, referred to differences in the way an individual deployed attention (Gardner & Moriarity, 1968). Attention may have been broad or narrow and a person's style may have been to scan or focus. In one test, subjects were required to match a projected circle of light to each of three disks. In another test they were required to adjust a circle of light so that its size matched that of other projected circles. Accuracy in matching on these tests was correlated with an individual's tendency and ability to verify experiences. Focusers, who scored high on these tests, were more likely to be more accurate in

making decisions than were scanners, who did poorly on the tests (Holzman, 1980).

Constricted versus flexible control was defined as a measure of individual differences in susceptibility to distraction and distortion in tasks with conflicting cues. When Smith and Klein (1953) first reported on this cognitive control dimension, they assessed it using a version of the Color-Word Test called the Stroop Test. It used types of cards colored red, blue, green and yellow with a single color name printed on each card. The color names, however, differed from the color of the cards. The subject's task was to identify correctly the color of the card while disregarding the conflicting cues provided by the color names. The extent to which a person could do this task quickly and accurately was a measure of the subject's cognitive flexibility. The constricted style was found to be more susceptible to distraction while the flexible style tended to concentrate on the task at hand (Gardner et al., 1960).

Tolerance for incongruous or unrealistic experiences related to one's readiness to accept perceptions at variance with conventional experience. A high tolerance style reflected a willingness to accept experiences that vary greatly from the ordinary or even the truth. Low

tolerance implies a preference for conventional ideas and reality orientation (Gardner et al., 1960).

Strong vs. weak automatization referred to the capacity to perform simple repetitive tasks. Relative skill in performing simple tasks was found to run contrary to relative skill in perceptual analysis, suggesting a style of automatization vs. restructuring. A strong automatization style appeared to concentrate on the obvious properties of a task, ignoring the detail that restructuring requires (Broverman, 1967)

Conceptual vs. perceptual defined the capability to perform novel or difficult tasks. Conceptually dominant persons exhibited greater facility for conceptual behaviors and less for perceptual motor ones. Perceptual-motor dominant individuals displayed the opposite pattern (Broverman, 1967).

Concept formation and retention styles. Conceptual tempo, identified as a style by Kagan and others, was a measure of how persons respond in situations of response uncertainty (Kagan et al., 1964). The speed and adequacy of hypothesis formulation and information processing on a continuum of reflection vs. impulsivity were the focus of investigation. Tests of cognitive conceptual tempo assessed children in respect to the different speeds with which they make decisions, usually under uncertain or

ambiguous conditions. When Kagan and his associates studied the relationships of conceptual tempo scores to reading test scores, their finding was that reflective pupils did better than impulsive ones. Research into conceptual tempo generally favors reflection over impulsivity. A reflective cognitive style was usually found more compatible than an impulsive one with school achievement. In academic performances the impulsive child was frequently described as confusing speed with achievement, as acting on hunches with little thought, and of responding to superficial or misleading cues. Impulsives tended to give the first answer they could think of even though it was frequently incorrect (Carbo, 1986). This child was also described as being an incorrect thinker who formulates superficial answers, and who is deficient in problem solving. Perhaps, most important of all, impulsivity was found to characterize many behaviorally disturbed children (Meichenbaum, 1977).

In contrast, reflective children were described as being thoughtful, persistent, and careful in their school work. Reflective pupils prefer to consider alternate solutions before deciding and to give more reasoned responses (Carbo, 1986) Though typically slower than impulsive children, they carried out their assignments more systematically and were more successful in achieving their

goals. They had also been found to be superior over impulsive children in respect to a variety of specific cognitive measures including visual discrimination, serial learning, inductive learning, word recognition and intelligence. Behaviorally, reflective children were more likely to be well adjusted than were impulsive ones (Blackman & Goldstein, 1982).

Conceptualizing styles referred to individual differences in approach to concept formation. This cognitive control dimension was originally described as equivalence range and defined in terms of people's consistency in what they will accept as similar or identical in a variety of tasks (Gardner, 1953). It was later redefined as "the degree of differentiation in an individual's experiences of similarity and differences" (Gardner et al., 1960). It was then renamed by Garner and Schoen (1962) as being a dimension of conceptual differentiation.

Conceptual differentiation referred to the tendency to conceive of things as having many properties rather than a few. In the object-sorting test that was originally used to assess this style, subjects were required to develop their own categories for sorting and then to sort some seventy-three objects accordingly. The assessment revealed the degree to which an individual regards things as

equivalent. An individual who had a low equivalence range was an individual who made many conceptual differentiations. An individual who had a broad equivalence range was low in conceptual differentiation. A high degree of conceptual differentiation was usually regarded as an indication of conceptual sophistication and flexibility (Gardner, 1953; Kagan et al., 1963; Kogan, 1972; Messick, 1976).

Among the eight general dimensions of conceptualizing styles were (1) breadth of categorizing; (2) cognitive complexity versus simplicity; (3) leveling and sharpening; (4) conceptual level; (5) curiosity; (6) persistence or perseverance; (7) level of anxiety; and (8) frustration tolerance.

Breadth of categorizing described one's preference for broad or narrow range in establishing conceptual categories. It was assessed by asking subjects to identify what they believe to be the minimum and the maximum plausible values for variables. The broad categorized individual liked to include many items in order to lessen the risk of leaving something out. They (the broad categorists) tended to pick relatively extreme answers and were thought habitually to make more abstract and creative groupings than do narrow categorists. Anderson (1980) found that more creative students had better inferential

comprehension skills, presumably because they were better able to create abstract meaning. The narrow categorist preferred to exclude doubtful items and lessen the probability of including something defiant (Messick, 1976; Kogan, 1973).

Cognitive Complexity versus simplicity referred to differences in the number of dimensions utilized by individuals to interpret the world. A high complexity style is multidimensional and discriminating, attuned to diversity and conflict. A low complexity style preferred consistency and regularity in the environment. The former was more effective in processing dissonant information; the latter in reconciling consonant experience. Harvey and his colleagues referred to this dimension as abstract versus concrete (Harvey, 1961; Bieri, 1977; Cohen, 1975; Scott, 1976).

Related to the dimension of abstract vs. concrete were Gregorc's cognitive learning styles. He (Gregorc) believed his four types of learning styles indicated a student's preference for a particular learning source and whether the pupil preferred to learn through concrete or abstract means. Abstract-sequential pupils preferred to deal with abstract concepts and symbols and preferred to do so through formally organized and systematically paced instruction. Concrete-sequential learners preferred

learning through concrete experiences, such as sensorimotor supports. Like abstract sequential learners, they learned better in a systematic, sequential way. Abstract-random learners preferred abstract conceptual modes of learning but preferred to learn in unstructured ways.

Concrete-random learners preferred concrete learning experiences and wished to learn through trial-and-error methods.

Leveling vs. sharpening described individual variations in memory processing. In one test, subjects were first placed in a dark room and given time to adapt visually to it. They were then required to judge squares of light that increased in size. It was found that subjects usually underestimated the size of the larger squares because their judgements had been influenced by the size of the earlier ones. Levelers were individuals who were particularly prone to assimilation. They tended to blur similar memories and to merge new precepts readily with previously assimilated experience. Levelers also tended to over-generalize. Sharpeners on the other hand were better able to resist the influence of earlier experiences and to assess more accurately the size of the later squares. Sharpeners were inclined to magnify small differences and to separate memory of prior experiences

more easily from current data. They tended to over-discriminate (Holzman et al., 1954).

The second dimension of learning style encompassed those dimensions of personality that had to do with attention, emotion, and valuing. Affective learning styles were motivational processes that could only be inferred from a person's interaction with the environment. These processes involved the intersecting and interacting of arousal, expectancy, and incentive. Arousal described the general level of attention and responsiveness of an organism. Optimum attention was ordinarily an intermediate level between boredom and excitement. Arousal encompassed traits such as curiosity, exploratory behaviors, boredom, anxiety, and frustration. Expectancy was the subjective certainty that a particular outcome would follow a particular act, that something would or would not occur. Anticipated satisfaction or emotional preference was associated with expectancy. Incentives could have been actual or symbolic rewards. Positive and negative reinforcers and punishment were viewed as incentives (Keefe, 1979).

Affective style was the result of a network of motivational processes that were subject to a wide variety of influences. The learner was affected by the cultural environment, parental and peer pressures, school

influences, and personality factors. Values were involved. Not every student was expected to be successful in every learning environment because accustomed habits could have proven to be in conflict with school values. Diagnosis of affective learning style was critical, then, to the effective functioning of the school learning process. Attention styles were defined by the following cognitive dimensions: (1) concept level; (2) curiosity; (3) persistence or perseverance; and (4) level of anxiety; Expectancy and incentive styles include: (1) locus of control; (2) achievement; (3) self-actualization; (4) imitation; (5) risk taking and cautiousness; (6) competition and cooperation; (7) level of aspiration; (8) reaction to reinforcement; (9) social motivation; and (10) personal interests (Keefe, 1979).

Conceptual level was a broad development trait characterizing how much structure a student required in order to learn best. A low conceptual level style indicated the need for high structure; high CL, that the learner required less structure. Closely related to conceptual level were responsibility, the capacity of students to follow through on a task without direct or frequent supervision, and need for structure, the amount and kind of structure required by different individuals (Hunt, 1978; Dunn & Dunn, 1978).

Curiosity was defined as differences in attraction to the novel or adventuresome aspects of the environment. It was seen as exploratory behavior, in reactions to changes or simply the need for change, and in the desire to escape boredom. Curiosity seemed to grow out of the perception of some kind of discrepancies in the environment (Berlyne, 1960; Montessori, 1912).

Persistence or perseverance referred to variations in a learner's willingness to labor beyond the required time, to withstand discomfort and to face the prospect of failure. High persistence was characterized by the disposition to work at a task until it is completed, seeking whatever kind of help was necessary to preservers. A low persistence style resulted in short attention span and the inability to work on a task for any length of time (Carroll, 1976; Dunn & Dunn, 1978).

Level of anxiety described the individual's level of apprehension and tension under stress conditions. The highly anxious were tense and worried while other individuals were "cool" emotionally. A low anxious learner performed better when challenged by a difficult task, particularly when his or her performance was to be evaluated. High anxious learners performed less well under the same conditions. There was some evidence that high

intelligence learners might have profited more from anxiety than the less able (Spielberger, 1972).

Locus of control was definitive of variations in individual perceptions of causality in behavioral outcomes on a continuum of internality vs. externality. The internal person thought of himself as responsible for his own behavior, as deserving of praise for success and of blame for failures. The external person saw circumstances beyond his control, luck or others as responsible for his behavior. There was some evidence that a greater sense of internality can be developed (Rotter, 1966; Crandall, 1978).

Achievement motivation described individual differences in patterns of planning and striving for some internalized standard of excellence. Individuals with high achievement motivation were interested in excellence for its own sake rather than for any rewards it may bring. These persons set their goal carefully after calculating the success probability of a variety of alternatives. This style was also called need for achievement (McClelland, 1978; Alschuler, 1977).

Self-actualization referred to differences in personal striving for adequacy. Maslow viewed life as a "continual series of choices for the individual in which the main determinant of choice is the person as he already is

(including his goals for himself, his courage or fear, his feeling or responsibility, his ego-strength or willpower, etc.)." The more actualized person had greater feelings of adequacy (Maslow, 1968)

Imitation was the tendency to repeat actions that appeared desirable in a given situation. The occurrence of imitative behavior seemed to depend on the perceived personality of the model, the personality of the learner and the interaction between the two factors (Bandura & Rosenthal, 1966; Fisher, 1977).

Risk taking versus cautiousness described individual differences in a person's willingness to take chances to achieve some goal. Risk takers preferred low probability-high payoff alternatives; cautious persons liked high probability- low payoff ones (Kogan & Wallach, 1967).

Competition vs. cooperation referred to the tendency of individuals to be motivated more by rivalry or by the sharing of experience. The highly competitive had a strong compulsion to win while the highly cooperative had a strong need to agree and support (Maccoby, 1974).

Level of aspiration was related to variations in learner perception of past success and failures in relation to subsequent school performance. Bloom and his colleagues termed this style academic self-concept (Bloom et al.,

1976). Past successes tended to develop modest self-confidence while failure was found to lead either to despair or to an unrealistic optimism born out of defeat. Those who often failed tend to develop a mind set ranging from a lowered level of expectance to the need to discredit the evidence of failure (O'Malley & Bachman, 1976).

Reaction to reinforcement referred to individual differences in response to reward and punishment. A positive reinforcer was defined as some kind of reward (e.g., praise, prizes, money). A negative reinforcer was defined as the removal of an unpleasant state or event (e.g., threat of punishment, scolding). Punishment was defined the removal of regard and the addition of an aversion stimulus. Students were generally motivated by reinforcement and variable in response to punishment (Skinner, 1977; Solomon, 1976).

Social motivation described differences in value-based behavior based on variation in social and racial/ethnic world view. Learners not only varied in socioeconomic background, in cultural determinants and value codes, and in peer-group conformity but were variously affected by the standards and expectations of these groups. Differences in social motivation were derived from one or a combination of determinants (Hill, 1976; Bennett, 1979).

Personal interests emphasized patterns of choice among alternatives that did not seem to result from external pressures. High interest was found to incline a learner toward an activity; low interest, from it (Wittrock, 1978).

The final grouping of learning styles arose directly from a consideration of the functioning of the human body. Physiological styles were biologically based modes of response that were founded on sex-related differences, personal nutrition and health, and accustomed reaction to the physical environment. Physiological factors were among the most evident influences in the process of school learning. Dimensions in this biological mode were identified as: (1) masculine or feminine behavior; (2) health-related behavior; (3) time rhythms; (4) need for mobility; and (5) environmental elements.

Masculine-feminine behavior described variations in typical brain-behavior responses of boys and girls. Researchers agreed that males generally were more aggressive and more sensitive to spatial (visual) relations than girls. Girls were more verbal and excel in fine muscular control. The sexes display differing attentions mechanisms and widely varying interest patterns (Nevill, 1977).

Health-related behavior was related to individual response differences resulting from the physical imbalance

of malnutrition, hunger, and disease. Dunn and Dunn (1978) referred to an aspect of this style as intake.

Time rhythms referred to individual variation in optimum learning patterns depending on the time of day. Some persons performed best in the morning; other in the afternoon or evening (Dunn & Dunn 1978).

Need for mobility described differences in learner need for change in posture and location. This dimension may have been both age and sex-linked since younger learners and males generally required more mobility (Dunn & Dunn 1978).

Environmental elements suggested consideration of individual preference for, or response to, varying levels of light, sound and temperature. Few learners were greatly bothered by light variations, but many found it hard to work with distracting noise levels, and wide temperature variations affect almost everyone (Dunn & Dunn, 1978).

Many researchers identified and defined learning style in their own unique ways--ways that did not lend themselves to unquestionable categorization in the three dimensions of learning styles chosen for organization purposes. Such research groups created systems that combined dimensions of cognitive style, affective style and physiological style and bore reviewing in some detail.

Focusing on the work of David Kolb (1976), Bernice McCarthy (1985) developed her own approach to defining and explaining individual differences in learning. Her (McCarthy's) 4MAT System of learning styles imposed right and left brain specialization on each of Kolb's original four types of learners.

In the early 1970s, Kolb, a management expert from Case Western Reserve University, developed an experiential learning model. He (Kolb) identified two major dimensions of learning, perception and processing and said that learning results from the way people perceive and then process what has been perceived. Kolb described two opposite kinds of perception. At one extreme were people who perceive through concrete experience and at the other extreme were people who perceive through abstract conceptualism.

In this way, Kolb's dimensions resembled cognitive complexity vs. simplicity, a concept formation and retention style. Kolb described a four-quadrant model of learning styles that included opposite ends of a continuum defining differences in processing in combination with the differences he had identified in perception. He (Kolb) referred to the processing extremes as reflective observation and active experimentation, much like Kagan's conceptual tempo.

Building on Kolb's four quadrants, McCarthy described four types of learners. Type One learners were those who perceived through concrete experience and processed through reflective observation. The second quadrant, called Type Two learners, were those who perceived through abstract conceptualization and processed through reflective observation. In Quadrant III were the Type Three learners, those who perceived through abstract conceptualization and processed through active experimentation. In Quadrant IV were the Type Four learners, who perceived through concrete experience and processed through active experimentation. Each of these learners, because of individual differences in perception and processing, developed a unique pattern to learning.

McCarthy's research on brain functioning, particularly studies of hemisphericity, resulted in modifications of her original four styles. The imposing of the right and left brain specialization on each of the four learning styles resulted in her 4MAT System.

In Type One learners, their right hemisphere searched for personal meaning through an experience and the left hemisphere sought to understand the experiencing by analyzing it. In the effort to find personal meaning, they often asked "Why?" These learners searched for a reason for learning and knowing something.

In Type Two learners, their right hemisphere searched to integrate experience with what they know and to clarify their need for more knowledge, while their left hemisphere searched for that new knowledge. For them the most important question was "What?" The most important thing about learning was identifying what can be known and seeking knowledge carefully and fully.

The right hemisphere of Type Three learners looked for an individual application and a use of the learning, while their left hemisphere looked for more general examples. The most important questions is "How does it work?" They cared about the general application of knowledge and about how they personally are going to use what they are learning.

Finally, Type Four learners ask the question "If?" Their right hemisphere seeks to develop extensions of their learning, the left hemisphere seeks to analyze the learning for relevance and significance. They wanted to see relationships and connections between things. They looked to synthesize skills and knowledge and personal meaning into something that created a new experience for themselves and others.

"The 4MAT system moved throughout the learning cycle in sequence, teaching in all four modes and incorporating the four combinations of characteristics. The sequence was

a natural learning progression that started with the teacher answering--in sequence--the questions that appeal to each major learning style" (McCarthy, 1985, p. 62).

Using this sequence, McCarthy believed that each learning style would have an opportunity to shine part of the time. All learners would be able to develop their own natural abilities when they were working in their own strongest learning style area. At the same time they would develop other abilities necessary to be good learners by working in other quadrants.

Aptitude-Treatment Interaction

One of education's most enduring attempts has been to match instruction to pupils' special characteristics or need. It has been an appealing idea that one type of instruction was appropriate for a particular type of pupil, another type of interaction for another type. Many efforts have been devoted to developing instructional and remedial approaches along the lines of this idea, i.e., adapted to special pupil characteristics such as high and low verbal ability, strong auditory and weak visual abilities.

The effort to validate this type of approach has been identified as aptitude-treatment interaction. Aptitude-Treatment Interaction (ATI) analysis was a systematic attempt to relate individual differences in aptitude,

including aspects of cognitive and affective style, to instructional method. Gage and Berliner (1979) defined it as "a situation that occurs when students high in one characteristic learn better when taught by one method while students lower in that characteristic learn better by another method" (p. 184). The ATI hypothesis was that aptitudes in the general sense--"whatever made a person ready to learn rapidly in a particular situation"--could and would interact with instructional treatment or method to affect student learning performance (Cronbach & Snow, 1977). Berliner and Cohen (1973) preferred the term "trait-treatment interaction," regarding "trait" as less restrictive than "aptitude." Hunt (1971) suggested "person-environment interaction."

Many of the arguments in support of the diagnostic-prescriptive approach were based on the presumption that valid aptitude-treatment interactions could be found and that such ATIs were educationally meaningful. Two research teams who supported this position were Walter Barbe and Raymond Swassing of The Ohio State University and Rita and Kenneth Dunn.

Barbe and Swassing focused on the modality differences in their definition of learning styles. "A modality was defined as any of the sensory channels through which an individual received and retained information. . . .

Sensation, perception and memory constituted what was referred to as modality" (Barbe & Swassing, 1979, p. 1).

According to Barbe and Swassing, a sensation was the purest interaction between an individual and the environment and occurred when an object or energy source from the environment impinged upon an individual. The most important characteristic of a sensation was that little or no meaning was attached to the stimulation.

When some meaning was ascribed to sensation, it became perception. Epstein (1967) defined perception as "an inferred process that intervenes between the measurable stimulus condition and the measurable overt response" (p. 10). In other words, the individual attached meaning to the sensation, and behaved accordingly. The behavior could have been overt or it could have been covert. Reading was an example of a covert behavior. The printed words served as the stimuli. The reader sensed the images on the page, related them to real or imagined events, and generated images that are consistent with the intentions of the writer.

Implicit in the definition of perception was the existence of what Barbe and Swassing called memory. They referred to memory as the storehouse from which information was recalled so that meaning can be ascribed to sensation (Barbe & Swassing, 1979).

The three modalities that were found to have the greatest utility in the classroom were the visual, auditory, and kinesthetic. Visual and auditory referred to perceptual abilities using the senses of sight and hearing, while the kinesthetic modality includes large muscle movements, small muscle movement and the sense of touch.

The chief reason that teachers needed to be aware of the modality strengths of the students for whom they had responsibility according to Barbe and Swassing, was that instruction could then be organized around those strengths. Instructional methods and materials that were consistent with the modality strengths of students had a greater likelihood of success and were often more enjoyable to both students and teachers.

Barbe and Swassing believed that a teacher's awareness of modality strengths should serve as the framework within which effective instruction can take place. Such an awareness would encourage the curriculum modifications that would benefit students, and would help the teacher avoid forcing his or her own modality strength on a student. In addition, when it appeared that a student had not grasped a lesson as it was first presented, knowledge of that student's modality strength could serve as the basis for a change in the manner of presentation.

Rita and Kenneth Dunn, perhaps the best-known researchers of learning styles, defined learning style as "the manner in which at least twenty three different elements of five basic stimuli affected a person's ability to absorb and to retain information, values, facts or concepts." The five basic stimuli were environmental, emotional, sociological, physical, and psychological.

Environmental stimuli included sound, light, temperature and design. The extent to which classrooms appeared either to stimulate or to inhibit learning for students with selected learning style characteristics has been documented in terms of individuals' needs for quiet versus sound, bright or soft lighting, warm or cool temperatures, and formal versus informal seating designs (Dunn, 1987; Dunn & Griggs, 1988). These four elements affected from 10 to 40 percent of students, dependent upon age, gender, hemisphericity, and achievement. For example, the need for sound remained fairly consistent during the elementary school years but increased as adolescence begins and as that stage passes, appeared to return to its previously normal level. The younger children were, the less light they needed; but about every five years most children required significantly more light than previously. Students were either stimulated or inhibited by the location in which they are trying to learn. Their

reactions were determined by their biological makeup (Thies, 1979; Restak, 1979).

Youngsters who were able to remain still at a conventional desk and seat were physically capable of being seated for long periods in a formal design. Those who preferred studying in a bed or in a lounge chair, a couch, or the floor, did better in an informal design. Prolonged sitting without postural changes was found to cause decreased blood circulation, which in turn, caused aches, pains, cramps, and/or numbness (Shea, T., 1983, cited in Carbo et al., 1986). However, the more children squirmed in their seats trying to find a comfortable position, the more likely it was that they would be accused of fidgeting and urged to sit still (Carbo, 1986).

Motivation, persistence, responsibility and structure were elements of emotional stimuli and appeared to be essentially developmental. They emerged over time as an outgrowth of the experiences youngsters have. Motivation correlates with achievement. When students became interested in learning, they were taught basic skills though their interests and their learning style strengths. Students permitted to work in their preferred learning styles performed better and tried harder than when prevented from working in ways that were natural to them (Wheeler, 1980).

Persistence was the only element that consistently correlated with IQ. When students with high IQ's who perform well academically were tested, they were highly persistent (Dunn & Price, 1980; Dunn, Dunn & Griggs, 1981). The general guidelines that tended to increase motivation, teaching through learning style, and provided on-level material in short sequences with immediate feedback, encouragement, and supervision, also tended to increase persistence gradually.

Students who did not do as they were directed were not always irresponsible. One study (White, 1981), revealed a strong correlation between responsibility and achievement via conformity on the California Psychological Inventory (CPI). Some students liked to be told exactly what to do, how to do it, when it is due and so on. They then proceeded to follow those directives and feel good about doing so. Some children however, were nonconformists. Often they did exactly the opposite of what their teachers suggested. Such youngsters may have been responsible, but they found it difficult to follow directions consistently (Carbo, 1986).

Hunt (1979) and Price (1980) found that the older students became, the less structure (direction, a sense of external organization) they needed. In many schools, the younger children were, the more choices they had.

Kindergartners often were permitted to sit where they liked in the room; high schoolers rarely were afforded that luxury. Kindergartners often were encouraged to choose their activities; high schoolers usually were given directions and mandated assignments. Some students of any age may require a great deal of structure; they may feel secure and work well with it. Some students of any age may be very self-structured (Carbo, 1986).

Sociological elements of learning alone, with others, or in a variety of ways, were found to affect achievement. In every class there were students who preferred to learn by themselves with appropriate resources, others who preferred to learn with peers, and some who wished to work directly with their teachers (Price, 1980). The influence of students' social preferences affected their achievement in school.

In several studies, when students' sociological preferences were identified and the youngsters then were taught in multiple treatments both responsive and unresponsive to their diagnosed learning styles, they achieved significantly higher test scores in matched conditions and significantly lower test scores when mismatched (Giannitti, 1988, cited in Dunn et al., 1989). Price (1980) found that students in grades 9-12 experienced a greater need to learn and study alone than during any

other grade interval. Gifted students also preferred to learn alone unless the material to be mastered was difficult for them. When that happened, they preferred to learn with other gifted children (Perrin, J., 1984, cited in Carbo et al., 1986).

Physical stimuli included perceptual strengths and preferences, intake, time of day energy levels and mobility. Like the environmental elements, those in the physical stimuli were biological in nature (Thies, 1979; Restak, 1979).

Sensory preferences influenced the ways in which students learn. Visual learners remembered what they saw and could retrieve details and events by concentrating on the things they had seen. An auditory learner was defined as one who could recall at least 75 percent of what was discussed or heard in a normal forty to forty-five minute period. The younger children were, the less likely they were to be auditory (Carbo, 1983a; Dunn & Carbo, 1981).

Students who used their fingers and hands while concentrating usually were tactual learners. They remembered more easily when they wrote, doodled, drew or moved their fingers. Tactile suggested learning with hands, through manipulation of resources. Tactual approaches were historically either ignored or used only

for reinforcement for underachieving youngsters (Barbe & Swassing, 1979).

Kinesthetic learners were those who learned most easily by a combination of tactual and kinesthetic experiences. Kinesthetic implied whole body involvement, such as taking a trip, dramatizing, interviewing, or pantomiming. These activities produced the mental imprinting that helped students to focus on what needs to be learned.

Approximately 20 to 30 percent of the school-aged population remembered what was heard. Forty percent recalled well visually the things that were seen or read. Many needed to write or use their fingers in some manipulative way to help them remember basic facts while other people could not internalize information or skills unless they used them in real-life activities (Carbo, 1986).

Several studies within the past decade revealed that when youngsters were taught with instructional resources that both matched and mismatched their preferred modalities, they achieved statistically higher test scores in modality-matched, rather than mismatched, treatments (Dunn, 1988; Martini, 1986, cited in Dunn et al., 1989). In addition, when children were taught with multisensory resources, but initially through their most preferred

modality and then were reinforced through their secondary or tertiary modality, their scores increased even more.

Many learners related to the need for intake when studying or concentrating. Prices's (1981) comparative study of the learning styles of students in grades three through twelve throughout the United States revealed that the need for intake paralleled the growth curve. During each period of rapid growth, youngsters' needs for intake increased. Having raw carrots, celery, green pepper, cauliflower, and other vegetables available for children who really need to eat while reading resulted in increased reading achievement at the elementary school level (MacMurren, H., 1985, cited in Dunn et. al., 1989).

Learning at the right time of day was found to improve achievement. One study (Virostko, 1983, cited in Dunn et al., 1989) examined the effects of time on student achievement in grades three through six. Students' instructional schedules in reading and mathematics were either matched or mismatched with their learning style time preferences over a two-year period. Significant gains were reported in both reading and math. More than 98 percent of the students achieved higher scores when taught either subject at the best time for them and did poorly when taught either subject at the nonpreferred time. An elementary school principal in Kansas administered the Iowa

Basic Skills Test in reading and mathematics to groups whose time preferences matched their test schedules--either early morning or afternoon. She (the principal) reported significantly higher test gains in both subjects as compared with each youngster's previous two years' growth (Lemmon, 1985).

Children's mobility needs often were related directly to their willingness, abilities, interests and energy levels. Fadley and Hosler (1979) noted that children often were referred to psychologists because of their consistent hyperactivity. Their teachers complained that such youngsters were unable to sit quietly and pay attention during lessons. Those psychologists reported that most students sent to them were not at all clinically hyperactive; instead, they were normal children in need of movement. They added that the less interested the children were in the lesson, the more mobility they required. During the same period, Restak (1979, 230) substantiated that "over 95 percent of hyperactive youngsters are males" and that the very same characteristic, when observed in girls, correlated with academic achievement. He added that conventional classroom environments did not provide male students with sufficient outlets for their normal needs.

DellaValle's (1984, cited in Dunn et al., 1989) research documented that almost half the seventh graders in

a large urban racially mixed junior high school could not sit still for any length of time. Twenty-five percent could sit still, but only when interested in the lessons. The remaining 25 percent preferred passivity. When preference and environment were matched, the students' performance yielded significantly higher test scores than when they were mismatched.

Psychological stimuli included elements related to brain functions that identify students as global and/or analytic, right and/or left hemisphere preferenced and impulsive or reflective. Many researchers believed the terms global/analytic, right/left hemispheric preference, and simultaneous/successive processing to be interchangeable. In other words, a person with strong left-hemispheric inclinations was an analytic learner who processed information successively, whereas a strongly right-hemisphere preferenced individual was global and a simultaneous information processor.

"Analytic" and "global" were not mutually exclusive predispositions. A person could be both, or strongly one or the other. Some individuals were able to process information analytically (linearly or step-by-step) or globally (holistally).

Global learners were helped to learn with stories, humor, and real-life experiences. They tended to make

broad general distinctions among concepts; they were able to see relationships. Individuals who learned best in a global fashion generally adhered to structures given; they wanted organization to be provided. They sought externally defined goals and reinforcements. Globals had a social orientation to the world and tended to learn material best with social content that was relevant to their own experiences. They tended to respond to emotional rather than to logical appeals and predictably, found that learning isolated, unrelated skills, was boring, difficult, and unnecessary.

Analytic learners usually liked and benefitted from skill work. They could concentrate and learn when information was presented to them in small, logical, sequential steps. They made specific concept distinctions and were interested in new concepts for their own sake. They had an impersonal orientation to the world and could self-structure goals and reinforcements. They tended to respond to logical rather than emotional suggestions.

Students who were extremely left or right hemisphere preferenced revealed that the two learned under very different conditions from each other (Dunn et al., 1982). For example, right preferenced students were less bothered by sound when studying, often prefer dim illumination, usually required an informal design, and were less

motivated toward conventional schooling than lefts. Right preferred learners were less persistent, preferred learning with peers, and preferred tactual more than either auditory or visual stimulation.

Right and left dominant students had different environmental and organizational needs when concentrating as well as different motivational and personality characteristics. Because schools imposed identical environments on everyone, conventional schooling accommodated the left preferred students and imposed a handicap on their extreme counterparts.

A study was undertaken (Bell & Roubinek, 1989) to determine if there were differences in achievement of right brain dominant and left brain dominant fourth-grade students on several achievement tests. The tests administered included the Stanford Achievement Test (SAT), the Iowa Test of Basic Skills (ITBS), and the Metropolitan Achievement Test (MAT). Findings indicated that right brain dominant preference children scored higher on the SAT than did children with left brain dominance preference. However, children with a left brain dominant preference did score higher than children with a right brain dominance preference on the Iowa Test of Basic Skills and the Metropolitan Achievement Test. The results of this study appeared to suggest that the specific achievement test

utilized to assess achievement may have had some effect on how children with different dominance preferences scored on an achievement test. Since children with different dominance preferences learned differently and performed differently on selected achievement tests, it might have been appropriate to allow children to demonstrate what they knew in a variety of ways when making an assessment about a child's achievement as opposed to focusing on only one measure.

In a comparative study of good and poor readers, Zenhausern (1982) reported that those who read well were divided evenly between left and right preferenced individuals. Of the nineteen poor readers, seventeen were right preferenced.

In identifying students as reflective or impulsive, teachers were encouraged to resist the tendency to think of one quality as positive and the other as negative. Both characteristics were considered valuable when used at appropriate times. Impulsive youngsters were the ones who became exuberant and called out, behaved spontaneously, and acted before they thought. Reflective students behaved contemplatively and appeared more responsive to controls.

In order to question students for the learning style factors, the Dunns, working with statistician Gary Price, evolved a self-reporting instrument called the Learning

Styles Inventory (LSI). Based on the Dunn and Dunn model, five separate instruments were developed: (1) a Learning Style Questionnaire, a 228 item survey appropriate for student in grades 3-12; (2) Learning Style Inventory, a 100 item instrument that provided individual and class profiles and subscale summaries of students in grade 3-12; (3) Productivity Environmental Preference Survey, a 100 item instrument that provided individual and group profiles and subscale summaries for adults; (4) Learning Style Inventory Primary Version, an illustrated questionnaire appropriate for children in kindergarten through grade 2; and (5) Reading Style Inventory (RSI), a survey appropriate for students in grades 3-12.

The Learning Style Inventory (LSI) assessed the conditions under which students preferred to learn in terms of the 23 elements of instructional conditions using dichotomous items (e.g., "I study best when it is quiet" and "I can ignore sound when I study"). Items were rated on a five point scale and can be completed in 30 to 40 minutes.

The LSI subscale summary indicated the number and percentage of the total group that identified a particular element as important or not important. These data were used to determine which of the 23 areas were of major or minor importance to an individual or within a group. The

LSI reported a Consistency Score on each student to reveal the accuracy with which the respondent has answered its questions.

The improvement of reading instruction continued to be a top national priority in the 1990s. Of the various solutions offered to raise reading achievement levels, one of the most promising was the use of learning style diagnosis and prescription in designing reading programs.

After years of working with poor readers and conducting research on reading and learning style, Marie Carbo developed the concept of "reading styles," coined the term, and designed observation guides and checklists that evolved into the Reading Style Inventory (RSI). The purpose of the RSI, an adaptation of the Dunn and Dunn learning styles model, was to identify the individual reading style preferences and strengths of youngsters when they read. The RSI assessed the same basic stimuli as the Learning Style Inventory to determine the combination of elements (defined by the stimuli) that were found to be unique to each individual's reading style. The Reading Style Inventory Individual Profile was a three-page computer printout that identified a youngster's reading style and recommended reading strategies, method, and materials (Carbo, 1981).

An impressive body of research on the Dunn and Dunn (1978) model of learning style indicated that (a) reading achievement and attitudes improved significantly when youngsters were taught to read through their individual styles; (b) student learning style preferences for reading differed significantly across grade and achievement levels; and (c) the Learning Style Inventory and the Reading Style Inventory were valid and reliable instruments that helped educators improve reading instruction. Carbo divided that research into five major categories: (1) environmental preferences; (2) perceptual strengths/preferences; (3) perceptual development; (4) comparisons across grade levels; and (5) comparisons across achievement levels.

The extent to which classrooms appeared either to stimulate or to inhibit learning for students with selected learning style characteristics was documented in terms of individuals' needs for quiet versus sound, bright or soft lighting, warm or cool temperatures, and formal versus informal seating designs (Dunn, 1987, Dunn et al., 1985). In two studies (Degregoris, C., 1986, & Pizzo, J., 1981, cited in Dunn et al., 1989) where the element of sound was examined, significant effects indicating increased achievement were found. Pizzo reported that sixth graders with a preference for quiet comprehended what they read better in a quiet rather than in a noisy environment, but

those students who preferred sound achieved significantly higher reading comprehension scores with talking in the background. Similar results occurred under conditions of bright or dim light. When students' light preferences were matched, reading achievement was significantly higher than when they were mismatched. Students preferring dim light read faster and more accurately in dim rather than bright light. The converse was true for youngsters preferring bright light (Krimsky, J., 1982, cited in Dunn et al., 1989).

Besides the amount of sound and light in an environment, formal or informal design, and mobility were found to affect reading performance either positively or negatively. Those students with a strong need for a formal design (sitting on a hard chair at a desk) performed slightly better in a formal design and were able to adjust to an informal design (sitting on rugs, pillows, soft chairs), by placing their bodies in a formal upright position. But youngsters with a strong need for an informal design had difficulty adapting to a hard chair at a desk and perform significantly better when they read in an informal rather than a formal design (Shea, T., 1983, cited in Carbo et al., 1986; Hodges, 1985, cited in Dunn et al., 1989). Mobility/passivity preferences were examined by DellaValle (1984, cited in Dunn et al., 1989)

whose sample was seventh grade students and by Miller (1985) who studied second graders. Both reported increased achievement, DellaValle in word recognition, and Miller in reading, when provisions were made for mobility preferences. Price (1980) in his work with fourth graders noted that boys tend to require more mobility than girls and, thus, found sitting for any length of time difficult.

An increasing number of studies supported the hypotheses that reading performance was strongly related to perceptual abilities (Morency & Wepman, 1973) and that achievement improved when youngsters learned through their perceptual strengths (Ingersoll & DiVesta, 1974; Daniel & Tacker, 1974; Wepman & Morency, 1975; Donovan, 1978; Wheeler, 1980; Wheeler, 1983).

Perception involved the identification or recognition of sensory data and the extraction of meaningful information from these data about what is being perceived. Most researchers defined a "perceptual preference" as the way in which a youngster prefers or likes to learn; whereas, a "perceptual strength" is generally defined as a measurable ability or skill possessed by the student).

In an early study conducted by Fry, a group of first grade students with a predominant auditory modality, acquired better silent reading skills when taught using an auditory approach than when a visual approach was used

(Fry, 1968). Fry's finding was corroborated by Mozingo nine years later. Her (Mozingo's) study of elementary school students with an auditory preference demonstrated better immediate and delayed recall of a list of memorized words presented to them in their strongest modality. Visually oriented students evidenced superior immediate retention of visually presented words (Mozingo, 1978).

Urbachat (1977, cited in Dunn et al., 1989) identified the visual and auditory strengths and weaknesses of first graders and found that their reading scores were significantly higher when words were presented through the learner's strongest modality. In a later study, Carbo (1980a) reported similar results with kindergartners, who learned three times as many words when taught through their perceptual strengths rather than their weaknesses.

In an investigation of the learning styles of nearly 4,000 subjects, Price (1980) found that the youngest children were the most tactile/kinesthetic. Those modality preferences were followed by the gradual development of visual strengths, and not until grades five and six were most youngsters able to learn and retain information presented through their auditory sense. Similar results were reported by Carbo using the RSI. Second graders were found to be significantly more tactile/kinesthetic and less visual/auditory than fourth, sixth, and eighth graders (Carbo, 1981).

Students differed significantly in the way they learned depending upon their age. Primary youngsters tended to be more global than older children (Sinatra, 1983), and retained words presented within the context of high-interest stories better than isolated words or letter sounds.

When the RSI was administered to 293 students in grades two, four, six and eight, the groups differed significantly on ten elements of reading style (Carbo, 1983a). The second graders preferred more intake and movement while reading, and a steady decline in reading enjoyment was evident throughout the grades. Older students were far less motivated to read. Both second and fourth graders preferred more structure when reading (fewer choices and more teacher directions) than the sixth and eighth graders, and the older students preferred to read alone more and to read with adults less than the second graders.

When the learning styles of 85 good and poor readers in third and sixth grades were compared, they differed in the following ways: (1) the good readers preferred a formal environment; (2) they were self-motivated, persistent, and responsible; and (3) they preferred to learn through their visual and auditory senses. The opposite was true of the poor readers who wanted to learn

in an informal area, were not persistent or responsible, and were adult-motivated and/or peer-motivated, but not self-motivated Price, Dunn, and Sanders (1980) found that the poor readers preferred to learn tactually and kinesthetically, and demonstrated a very low preference for learning through their visual and auditory modalities.

Nearly identical results were reported by Carbo (1981b), who noted that the reading styles of poor readers resembled those of second graders on the elements of perception, intake, and mobility. In comparison to the good readers, poor readers had less auditory and visual strength and stronger tactile and kinesthetic preferences. The poor readers also were: (1) less self-motivated and responsible; (2) more peer-motivated; (3) preferred fewer choices and a quieter reading environment; (4) wanted their reading work checked sooner; and (5) preferred reading less in the morning than the good readers.

Differences in hemispheric dominance existed between poor and good readers as well. Poor readers tended to be right-brain-dominant learners (Oexle & Zenhausern, 1981) who did poorly in sequential, step-by-step reading programs, but thrived with holistic methods emphasizing visualization techniques (Maxwell, M., 1983, cited in Carbo, 1984).

Research comparing learning styles across achievement levels indicated that poor readers demonstrated a decided preference for learning in an environment that differed from that of many classrooms. Handicapped, "at risk," and other poor readers may have experienced difficulty learning to read because instruction did not accommodate their individual learning styles (Carbo, 1978; 1983a,b; Dunn, 1988; Hodges, 1987).

Sudzina (1987, cited in Dunn et al., 1989) compared the differences in reading styles of good, average, and poor readers in each of three basal reader programs. Among her findings were the following: (1) students who were most likely to achieve well had reading styles that matched the reading instruction being offered; and (2) holistic reading approaches matched the reading styles of the subjects significantly more often than the phonics and whole-word approaches. Her (Sudzina's) study indicated that the reading methods most used in developmental reading programs (whole-word and phonics) severely mismatched the reading styles of many poor readers, thereby making learning to read difficult and unpleasant.

Matching instruction with students' reading styles resulted in significantly higher achievement in reading fluency and comprehension across grade levels. Of particular importance was the finding that many youngsters

at risk of school failure learned to read at rates two to five times greater than their former rates (LaShell, 1986)

LaShell (1986, cited in Carbo et al., 1986) examined the reading achievement of 90 learning-disabled youngsters in grades two through six. Her control group was taught with a strong phonic approach. The children in the experimental group were taught by methods that matched their reading styles, as disclosed by the Reading Style Inventory (RSI). Assessments made after ten months indicated that whereas children in the control group gained an average of 3.9 months in reading achievement, those in the experimental group advanced an average of 1.4 years.

Similar findings were reported by Helene Hodges (1984, 1985), David Adams (1983), and Patricia Lemmon (1983). The twice-retained underachievers with whom Hodges worked at an inner city junior high school in Harlem were reading from three to five years below grade level. But those students averaged reading gains of 1.9 years in just one school year, when the instructional program was matched to their reading styles. Adams found that sixth graders at Juanita Elementary School in Kirkland, Washington had increased their reading comprehension scores by as much as 11 percentile points within four months of the time that their teachers began to use the Reading Style Inventory. Lemmon reported three-year gains in reading over a 10-month

interval for 26 remedial reading student in grades one through six after she matched her instruction to the reading styles of the students.

Synthesis of the Literature

Efforts to explain the underlying processes of learning and teaching reflected two lines of research. One was concerned with applied models of learning styles that focused on the multidimensional implications of learning style. Interview techniques or self-report questionnaires were utilized to allow individuals to identify their own perceptions of their characteristic traits. The other line of research retained a strong preference for the cognitive style dimension that focused on information processing.

Elementary schools have been charged with the task of teaching every child to read. Research in reading has shown that the elementary grades are critical in determining future school achievement. Chall (1984) found that if a child was reading poorly or not at all by the fourth grade, the chances of turning the child's progress around were increasingly small.

Often poor readers experienced difficulties not only in decoding and comprehending the written word, but in such areas as initiating or completing tasks, working accurately, maintaining concentration, following written

and oral directions, and staying in their seats. Boys more frequently than girls experienced failure in learning to read. Many hypotheses have been formulated in an attempt to explain this pattern. Though the reasons for reading failure varied, most adults in the school routinely located the cause of failure in the child, rather than in the classroom setting or in the school environment.

The quality of interactions between students, teachers and subject matter has been identified as the most important aspect of the educational experience. Teaching styles and learning styles greatly influence these interactions. Unfortunately, these interactions often played themselves out in ways which discouraged, rather than encouraged. One primary reason might have been that all students were expected to learn the same things under the same conditions.

No single approach has been identified as the best way to teach reading. Many different approaches have been tried, some of which have been effective with some children and ineffective with others. Each youngster learns differently from every other one and it is the match between how the learner learns and the teaching method that determines who learns what and how much (Carbo, 1986, p. 1).

Conclusions and recommendations throughout the learning style literature reflected several common themes:

(1) individuals prefer to learn differently; (2) individual learning styles are identifiable; (3) teachers and institutions have a responsibility to consider style in instructional delivery; (4) the students' recognition of their own learning styles can help them make useful decisions regarding their approaches to selecting and processing information; and (5) matching or mismatching learning style and instructional technique has significant implications for both cognitive and affective learning.

According to Carbo (1987), "The research on reading styles has made one thing clear: reading achievement generally depends on how well the instructional program accommodates a given youngster's natural reading style."

Just as learners were shown to have their own styles and their own sets of distinctive behaviors (which served as indicators of how they learned from and adapted to their environment), so teachers were shown to have their distinctive teaching styles. Schools that used and celebrated diversity in teaching styles, particularly in relation to reading instruction, created opportunities for all students to find their style accommodated at some time and in some classrooms. The teaching of reading has been regarded as a responsibility that should be undertaken with the expectation that every effort will be made to help students succeed.

CHAPTER 3

METHODS AND PROCEDURES

Introduction

The purpose of this study was to explore questions related to reading achievement and perceptual preferences. A further purpose of the study was to examine The Reading Style Inventory and The Gregorc Style Delineator for common elements. The following questions were investigated:

1. Do students whose perceptual preferences match those of the reading teacher show greater achievement in reading comprehension than students whose perceptual preferences are mismatched with those of the reading teacher?
2. Is there a significant difference in the mean achievement scores in reading comprehension between boys and girls?
3. Is there a significant difference in the mean achievement scores in reading comprehension among students in grades 2, 3, 4 and 5?
4. Is there a significant relationship between perceptual preference and gender of the respondent?

5. Do The Reading Style Inventory and The Gregorc Style Delineator have elements in common?

In addition to the above questions, details of the design and methodology of the study are presented. Descriptions of the subjects, of the instruments selected and of the procedures used for data analysis are reported.

In order to explore the questions set forth in this investigation, an exploratory design was employed. Flexibility to examine selected elements of style in relation to reading achievement was desired, as well as the flexibility to compare two independently developed instruments.

Subjects

The subjects in this investigation were students and teachers from Alcoa Elementary School. A stratified proportional procedure with grade level as the stratifying variable was used to select one hundred and twenty students in grades two, three, four and five from the Chapter I population. Of the total Chapter I student population in grades two through five, second grade students accounted for 33.3 percent, third grade students represented 24.2 percent, fourth grade students represented 29.2 percent and fifth grade students represented 13.3 percent. In the

sample, those percentages corresponded to the following numbers: 40 second graders, 29 third graders, 35 fourth graders and 16 fifth graders for a total of 120 student subjects. There were 77 boys and 43 girls.

Students who scored at the 49th percentile or below the 49th percentile in the area of total reading as measured by The Stanford Achievement Test were eligible for Chapter I services. Each student had a reading comprehension score from the 1990 Spring administration.

The total population of state certified and state supported classroom teachers of grades two, three, four, and five in the school was selected. Of the twenty-two teachers, six teachers taught grade two, six teachers taught grade three, five teachers taught grade four, and five teachers taught grade five. There were twenty-one females and one male, all of whom taught reading.

Instrumentation

Three instruments were utilized in the investigation. They include The Reading Styles Inventory (RSI), The Gregorc Style Delineator, and the reading comprehension subtest of The Stanford Achievement Test, Form E.

The RSI was based on the model of learning styles described by Rita and Kenneth Dunn. There were 23 elements of reading style measured by the RSI, grouped into four

major categories: environmental stimuli, emotional stimuli, sociological stimuli, and physical stimuli.

The RSI yielded a measure of the 20 elements for each student. Environmental stimuli included sound-music, sound-talking; light; temperature; design-informal; design-organized. Emotional stimuli included peer motivated; adult motivated; persistent; responsibility; structure--choices; structure-direction; structure-work checked immediately; and structure-work checked self. Sociological stimuli referred to students preferences for reading to: teacher, peers, alone, peers and adult, and one student. Physical stimuli referred to intake; reading in the morning, early afternoon, late afternoon, evening; mobility; students had auditory strengths, visual strengths, tactual preference; and kinesthetic preference.

The RSI was not a test, but a questionnaire with no right or wrong answers. There were two parts. There were no time limits, but most students completed the instrument in about 30 minutes. Completed answer sheets were returned to the publisher for scoring, interpretation and recommendations. Specific interpretations and recommendations were given as to the learning styles of the student. Specific teaching techniques were also given to capitalize on the specific learning styles, referring to

pages in the RSI manual. Group summaries were also available.

There were no norms or description of a standardization sample reported. Also, there were no numerical scores available to the respondent, such as standard scores, used in the traditional context. The RSI did not provide grade levels of reading nor did it describe specific diagnostic reading problems.

Test-retest reliability coefficients for the RSI scales for all grade levels ranged from .63 to .77. The RSI scales with reliabilities of .70 or higher for all grade levels were sound (.72), design (.71), motivation (.70), structure (.72), auditory perception (.74), visual perception (.71), kinesthetic preferences (.75) and mobility (.76).

As a part of the test-retest reliability study described above, analyses of variance (ANOVA) were performed on the data to determine if the RSI discriminated among the identified groups. Good, average and poor readers differed significantly on ten reading style elements; significant differences among mean scores emerged on ten reading style elements across grade levels, and boys and girls differed significantly on three reading style elements.

The Gregorc Style Delineator is a self-analysis tool for identifying four basic channels through which the mind receives and expresses information. The channels are labeled Concrete Sequential, Abstract Sequential, Abstract Random, and Concrete Random.

The reliability of the Gregorc Style Delineator was assessed in terms of internal consistency using standardized alphas as the statistics, and in terms of stability using a test-retest correlation coefficients as the statistics. Standardized alphas were 0.92 and 0.92 for the Concrete Sequential scale; 0.89 and 0.92 for the Abstract Sequential scale; 0.93 and 0.92 for the Abstract Random scale; and 0.91 and 0.91 for the Concrete Random scale. Correlation coefficients between the first and second tests were 0.85 for the Concrete Sequential scale; 0.87 for the Abstract Sequential scale; 0.88 for the Abstract Random scale; and 0.87 for the Concrete Random scale.

The validity of the Gregorc Style Delineator was assessed in terms of construct validity by interview, predictive validity by correlation between Style Delineator scores and attribute scores, and responses to the descriptions resulting from the Delineator. Correlations between Style Delineator scores and ratings of attributes were 0.68 and 0.70 for the Concrete Sequential scale; 0.68

and 0.76 for the Abstract Sequential scale; 0.61 and 0.60 for the Abstract Random scale; and 0.55 and 0.68 for the Concrete Random scale.

The Reading Comprehension Subtest of The Stanford Achievement Tests (SAT, Primary Levels One, Two and Three, Form E, 1982) was used to assess reading achievement in April 1990. Scores from the SAT had been used by the Alcoa City Schools to measure end-of-the-year skills levels. In addition, the SAT scores were used by teachers as one of the primary criteria for determining (1) group placement in each classroom, (2) eligibility for Chapter I services, and (3) promotion and retention recommendations.

Measures of test-retest reliability on the SAT Reading Comprehension Subtest for Form E Primary Levels One, Two and Three were reported to be .94, .92 and .94 respectively. According to the publisher, the validity of the SAT was based primarily on its content. The reading comprehension tests included three types of reading passages: textual, functional and recreational. Development of the test items began with the formulation of objectives. A thorough analysis of curriculum materials was undertaken in addition to students of syllabuses, state guideline, and research literature pertaining to reading concepts at successive ages and grades (Gardner et al.,

1982). Items selected for the final form were reviewed for clarity, style and bias.

The standardization of the SAT was designed to obtain normative data that was descriptive of achievement in the nation's schools and to establish statistical reliability and validity of the tests. The fall standardization sample for the entire Stanford Series included approximately 250,000 students in grades kindergarten through thirteen from 300 school districts; and the spring standardization included 200,000 students in grades kindergarten through thirteen. In order to obtain a representative sample of students, the SAT standardization population was stratified by geographic region, size of enrollment, proportionate minority representation, and a demographic index based on community characteristics (Gardner et al., 1982).

Procedures

Teachers were administered The Reading Style Inventory (for adults) and The Gregorc Style Delineator during a regular faculty meeting. Both instruments were completed by the teachers according to published guidelines. At the conclusion of the meeting, completed instruments were collected and coded with a two digit number (name code) known only to the respondent and to the researcher to assure anonymity. Teachers' preferences for tactile and

kinesthetic stimuli were identified from responses to The Reading Style Inventory. Teachers' dominant styles of processing and ordering information were determined from responses to The Gregorc Style Delineator. The computation required to complete the instrument and to determine dominant styles was checked for accuracy. Teachers' dominant styles were then identified as Concrete Sequential, Concrete Random, Abstract Sequential and Abstract Random.

The 120 students selected for the study were administered The Reading Styles Inventory and The Reading Comprehension Subtest of The Stanford Achievement Test as part of their regular remedial reading program. Student data were collected from existing school records and were coded with two Arabic letters to assure anonymity.

Students were classified as matched or nonmatched based on comparisons of students' and teachers' tactile and kinesthetic preferences as reported by The Reading Style Inventory. Tactile preferences were reported as strong, moderate or mild, while kinesthetic preferences were reported as strong or moderate. A student was considered a match with the teacher when both student and teacher shared the same descriptor (strong, moderate, or mild) for each element of reading style.

Student reading comprehension scores, reported as normal curve equivalent scores, were compiled from individual test profile sheets. Student scores were then entered into the computer along with the appropriate two-digit teacher name codes, grade levels of the students, gender of the students and student designations as a match or not a match with the perceptual preferences of the teachers.

Data Analysis

In order to look at reading achievement in relation to perceptual preference and to address other questions set forth in the purposes of this investigation, student scores, reported as normal curve equivalent scores, were collected for analysis. The primary intent of the analysis was to determine if student achievement in reading comprehension was greater when the tactile and kinesthetic preferences of students and teachers were matched than when perceptual preferences of students and teachers were not matched. In addition, the intent was to determine if there was a significant difference in the reading comprehension scores of girls versus the reading comprehension scores of boys. Reading comprehension scores for students in grades two, three, four and five were examined for significant differences among grade levels. Further, the intent was to

find out if there was a significant relationship between perceptual preference and the gender of the respondent.

Data were collected from the instruments completed by teachers for the purpose of matching students' styles and identifying dominant styles of processing and ordering information. The intent of the collection of data from teachers was to compare the RSI and the GSD for common elements and to determine if one instrument could be used to inform the other.

For student scores, normal curve equivalents were selected because they (NCEs) are based on national norms that equalize differences between grade levels so that one grade can be compared with another. Normal curve equivalent scores have equal intervals and are always referenced to the performance of nationally represented samples of students. The scale is normalized and has a mean of fifty and a standard deviation of 21.06. Where it is valid to assume that the characteristic being measured is normally distributed in the population, the NCE scale will have equal intervals and it will be legitimate to perform mathematical operations using NCEs.

The student data collected in this investigation were analyzed at the .05 alpha level of significance using The Statistical Analysis System for computers (SAS).

Questions 1 and 2 were tested using t tests for significant

differences between independent means. An analysis of variance, a SAS general linear models procedure, was used to determine statistical difference in means scores between groups for Question 3. Chi square tests of independence were used to determine if relationships existed between the variables, perceptual preference and gender for Question 4.

The data collected from teachers were used to explore Question 5. Descriptive data facilitated the examination of the RSI and the GSD for common elements.

CHAPTER 4

FINDINGS

Introduction

The data obtained in this investigation were collected and analyzed in order to answer the questions set forth in the purpose of the study. The primary question concerned perceptual preference in relation to reading achievement. Was student achievement in reading comprehension greater when the perceptual preferences of students and teachers were matched than when the perceptual preferences of students and teachers were not matched? Other questions were proposed to determine: if there was a significant difference in the reading comprehension scores of girls versus the reading comprehension scores of boys; if there was a significant difference among grade levels 2, 3, 4, and 5; and if there was a significant relationship between perceptual preference and the gender of the respondent. An additional question was examined by comparing the RSI and the GSD. Did the two independent instruments have elements in common?

Data were gathered from teachers and from existing student records. Teachers were administered The Reading Style Inventory to identify their (teachers') preferences for tactile and kinesthetic stimuli. They (teachers) also

completed The Gregorc Style Delineator to determine their dominant styles of processing and ordering information. (Refer to page 119.) Student data were collected from individual Reading Style Inventory Profiles and from individual reports of the Reading Comprehension Subtest of The Stanford Achievement Test.

Student reading comprehension scores, reported as normal curve equivalent scores, were compiled from individual test profile sheets. Student scores were then entered into the computer along with the appropriate two-digit teacher name codes, grade levels of the students, gender of the students and student designations as a match or not a match with the perceptual preferences of the teachers.

Students were classified as matched or nonmatched based on comparisons of students' and teachers' tactile and kinesthetic preferences as reported by The Reading Style Inventory. Tactile preferences were reported as strong, moderate or mild, while kinesthetic preferences were reported as strong or moderate. A student was considered a match with the teacher when both student and teacher shared the same descriptor (strong, moderate, or mild) for each element of reading style. The perceptual preferences of thirty-three students were found to be matched with the perceptual preferences of their teachers. The perceptual

preferences of eighty-seven students were not matched with those of their teachers.

Findings of the investigation are reported in Chapter 4. The accumulated data are presented and analyzed in the form of t tests, an analysis of variance table, chi square tables and graphic representations.

With regard to the question of greater achievement in reading comprehension given students whose perceptual preferences match their teachers' perceptual preferences versus students whose perceptual preferences did not match their teachers' perceptual preferences, there was no statistically significant difference in the mean comprehension scores of those students whose perceptual preferences matched those of their teachers from those who did not match with those of their teachers (43.36 versus 42.98). The results of the t test are shown in Table 1.

When the mean achievement scores in reading comprehension of girls were compared with the scores of boys, a significant difference was found. The mean comprehension score of girls (48.47) exceeded the mean comprehension score of boys (40.09). The table t = 1.658 at .05 alpha level, 89 degrees of freedom. The results may be seen in Table 2. Additional t tests were performed on the mean scores of boys and girls who were matched and who were not matched to determine where the significant

Table 1
t Test Procedure by for Scores That Were Matched and Not Matched

Variable: NCE90									
PREF	N	Mean	Std Dev	Std Error	Variances	T	DF	Prob > T	
Matched	33	43.36363636	16.62441387	2.89393900	Unequal	0.1118	54.7	0.9114	
Unmatched	87	42.98965517	15.62177992	1.67483061	Equal	0.1150	118.0	0.9086	

Table 2
t Test Procedure for Scores of Females and Males

Variable: NCE90									
SEX	N	Mean	Std Dev	Std Error	Variances	T	DF	Prob > T	
Female	43	48.47441860	15.07770497	2.29932845	Unequal	2.8902	89.2	0.0048	
Male	77	40.08701299	15.53665742	1.77056644	Equal	2.8655	118.0	0.0049	

difference might be found. A significant difference was found between the boys and girls who were not matched with their teachers ($t = 2.816$, $p > .005$). The table $t = 1.658$, 85 degrees of freedom, one tailed test, .05 alpha level.

The mean achievement scores in reading comprehension among grade levels were also compared. An analysis of variance for unbalanced data was used to determine if there was a significant difference among students in grades two, three, four and five. No significant difference was found. At 3 and 116 degrees of freedom, the calculated f value = .27, $p > .08$, did not exceed the value listed in the table ($f = 2.68$ at the .05 alpha level). Results are shown in Table 3.

Additional t tests were used to compare the mean scores of students at each grade level who matched and who did not match with their teachers on tactile and kinesthetic preferences. No significant difference was found in any of the four grade levels. Figures 1 and 2 show the graphic representation of student tactual and kinesthetic preferences, respectively, by grade level.

In order to determine if a significant relationship existed between perceptual preference and gender of student respondents, two chi square tests of independence were performed. Results for the tactile preference with gender indicated no significant relationship with $X^2 = 5.06$, $p >$

Table 3

Styles Analysis

General Linear Models Procedure					
Dependent Variable: NCE90					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	1655.0686	551.6895	3.38	0.0840
Error	116	28179.5946	242.9275		
Corrected Total	119	29834.663			
	R-Square	C.V.	Root MSE		NCE90 Mean
	0.055475	36.16902	15.586		43.092

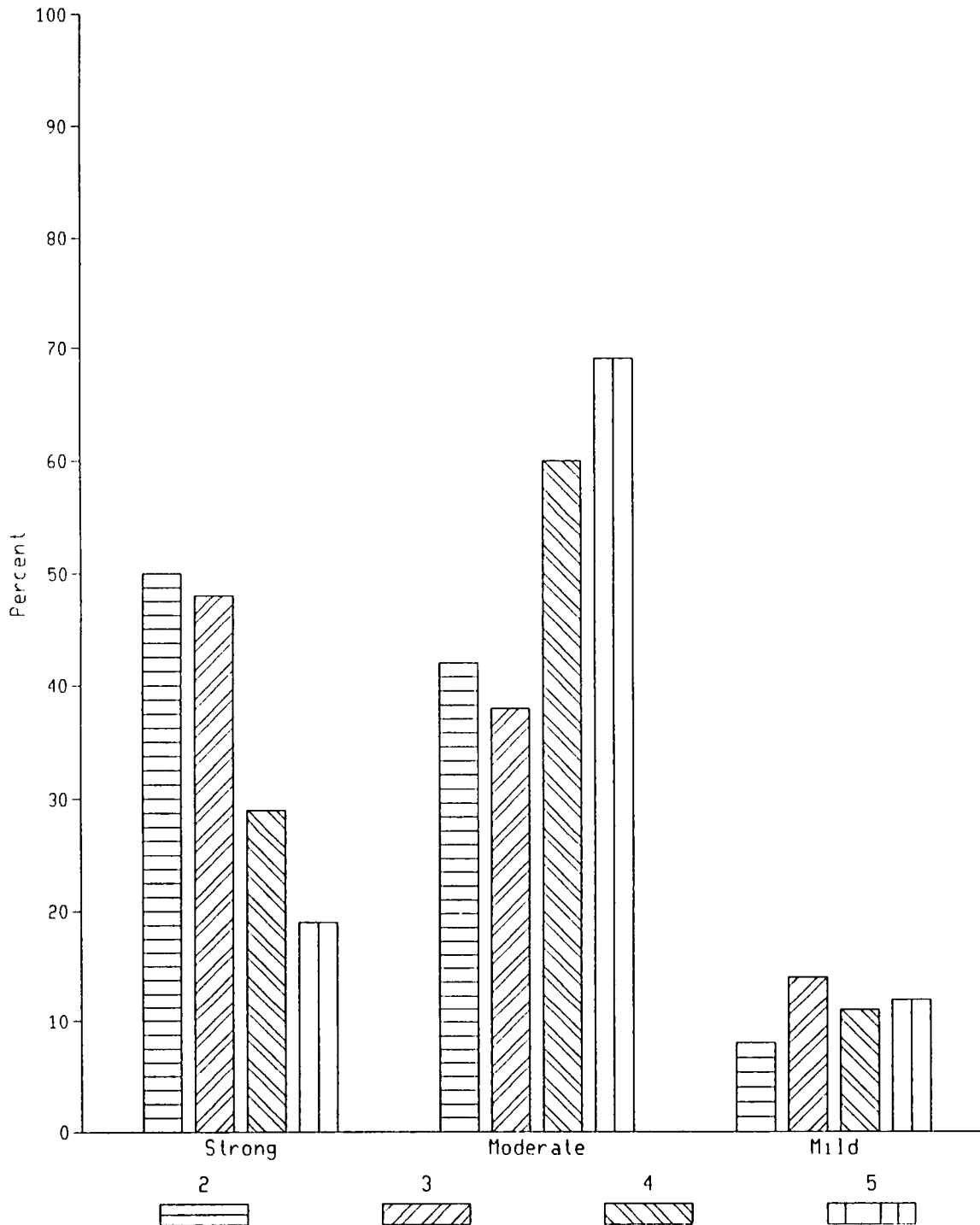


Figure 1. Graphic Representation of Student Tactual Preferences by Grade Level.

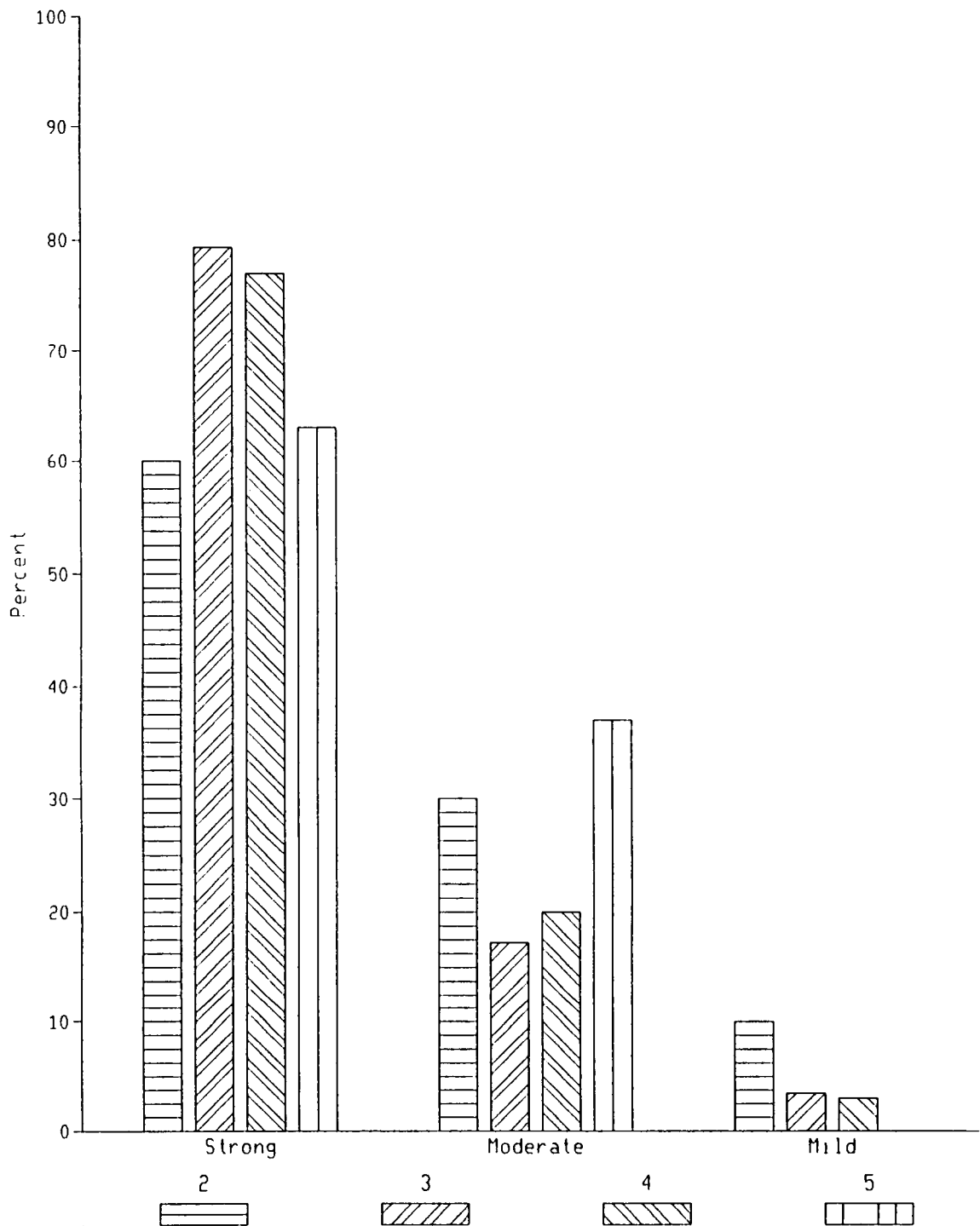


Figure 2. Graphic Representation of Student Kinesthetic Preferences by Grade Level.

.08. Results from the kinesthetic preference with gender also indicated no significant relationship with $\chi^2 = 1.01$, $p > .60$. The chi square value listed in the table at the .05 alpha level at two degrees of freedom was 5.99.

Results are shown in Figures 3 and 4. Though no significant relationship was found between perceptual preference and gender, the greater percentage of females as compared to the percentage of males tended to have strong and moderate tactile preferences. More males than females tended to have moderate kinesthetic preferences and mild tactile preferences. The percent of male and female students by their tactual and kinesthetic preferences are illustrated in Figures 5 and 6.

When The Reading Style Inventory and The Gregorc Style Delineator were examined for common elements, no common elements were found. The two instruments were found to define and to measure style in very different ways.

In examining the data generated by teachers who completed The Reading Style Inventory, eight of the twenty-two teachers indicated a strong preference for tactile stimuli; twelve teachers indicated a moderate preference, and two teachers indicated a mild preference for tactile stimuli (Figure 7). Seventeen teachers were identified as having strong kinesthetic preferences while five teachers expressed moderate preferences (Figure 8).

TACTILE		SEX		
Frequency				
Expected				
Cell Chi-Square				
Percent				
Row Pct				
Col Pct		Female	Male	Total
mild	1	1	12	13
		4.6583	8.3417	
		2.873	1.6044	
		0.83	10.00	10.83
		7.69	92.31	
		2.33	15.58	
moderate	2	24	36	60
		21.5	38.5	
		0.2907	0.1623	
		20.00	30.00	50.00
		40.00	60.00	
		55.81	46.74	
strong	3	18	29	47
		16.842	30.158	
		0.0797	0.0445	
		15.00	24.17	39.17
		38.30	61.70	
		41.86	37.66	
Total		43	77	120
		35.83	64.17	100.00

Statistics for Table of TAC by Sex

Statistic	DF	Value	Prob
Chi-Square	2	5.055	0.080
Likelihood Ratio Chi-Square	2	6.219	0.045
Mantel-Haenszel Chi-Square	1	1.987	0.159
Phi Coefficient		0.205	
Contingency Coefficient		0.201	
Cramer's V		0.205	
Sample Size = 120			

Figure 3. Student Tactual Preference by Sex

KINESTHETIC		SEX		
Frequency				
Expected				
Cell Chi-Square				
Percent				
Row Pct				
Col Pct		Female	Male	Total
mild	1	3	3	6
		2.15	3.85	
		0.336	0.1877	
		2.50	2.50	5.00
		50.00	50.00	
		6.98	3.90	
moderate	2	9	21	30
		10.75	19.25	
		0.2849	0.1591	
		7.50	17.50	25.00
		30.00	70.00	
		20.93	27.27	
strong	3	31	53	84
		30.1	53.9	
		0.0269	0.015	
		25.83	44.17	70.00
		36.90	63.10	
		72.09	68.83	
Total		43	77	120
		35.83	64.17	100.00

Statistics for Table of TAC by Sex

Statistic	DF	Value	Prob
Chi-Square	2	1.010	0.604
Likelihood Ratio Chi-Square	2	1.000	0.607
Mantel-Haenszel Chi-Square	1	0.000	0.987
Phi Coefficient		0.092	
Contingency Coefficient		0.091	
Cramer's V		0.092	
Sample Size = 120			

Figure 4. Student Kinesthetic Preference by Sex

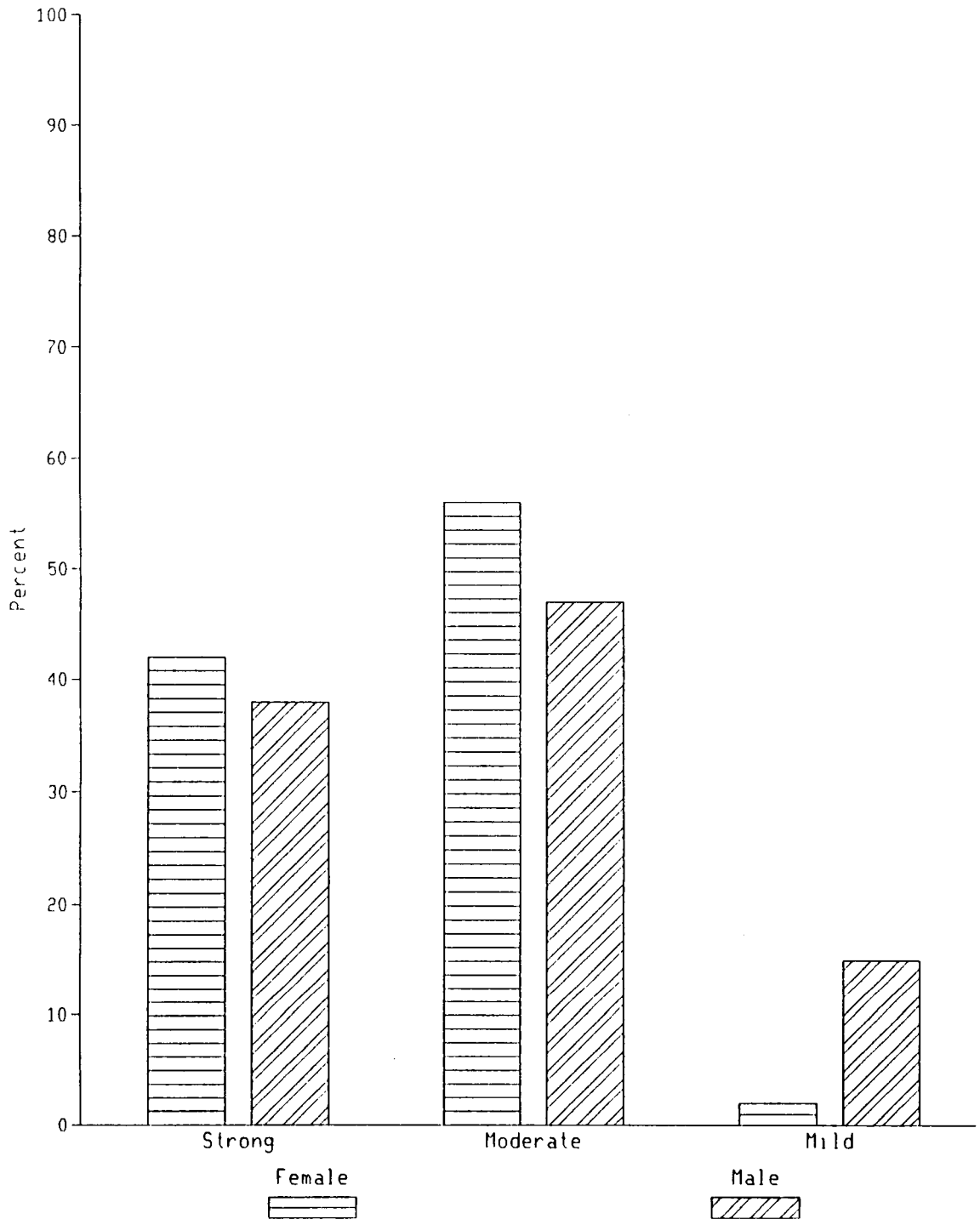


Figure 5. Graphic Representation of Student Tactual Preferences by Gender.

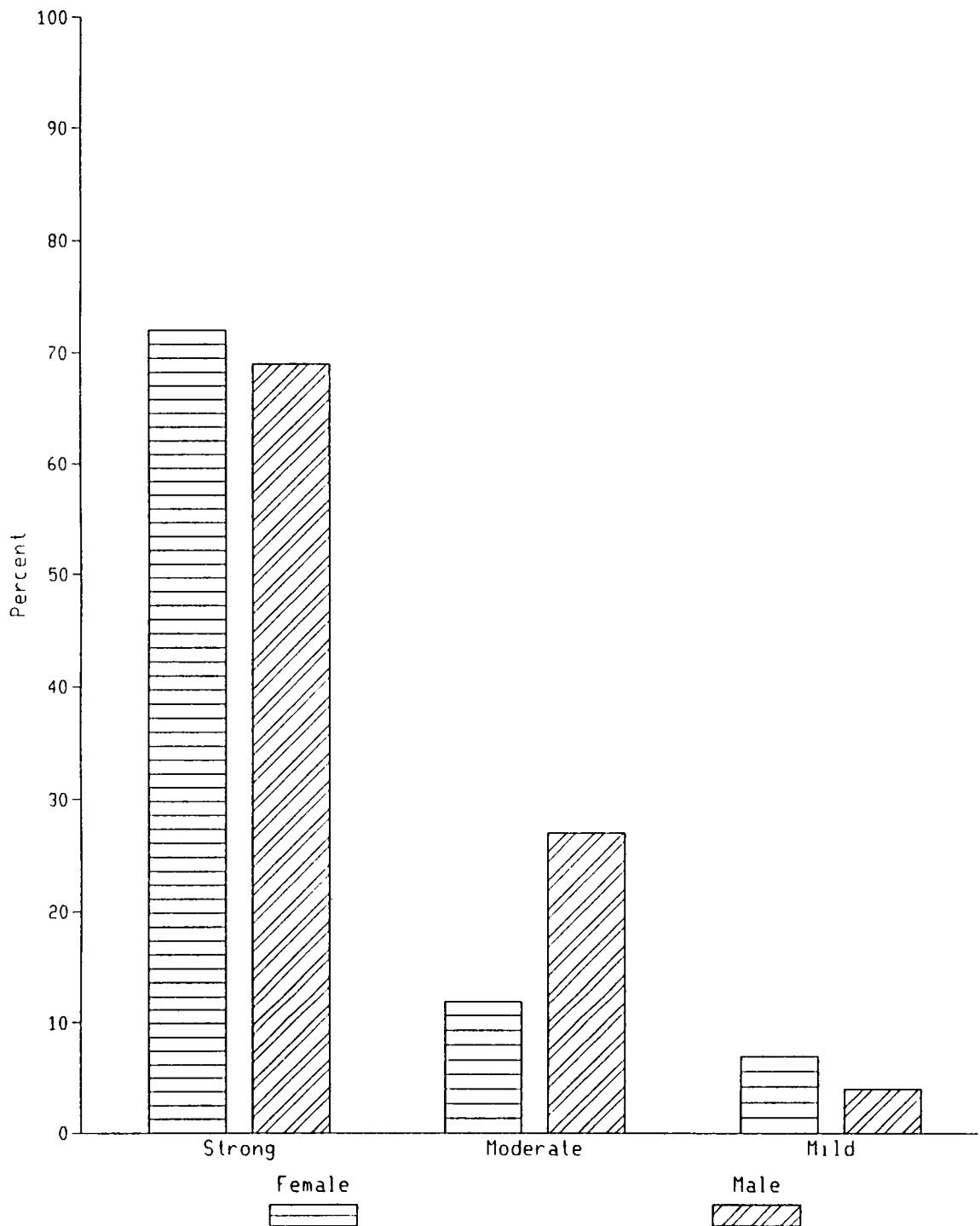


Figure 6. Graphic Representation of Student Kinesthetic Preferences by Gender.

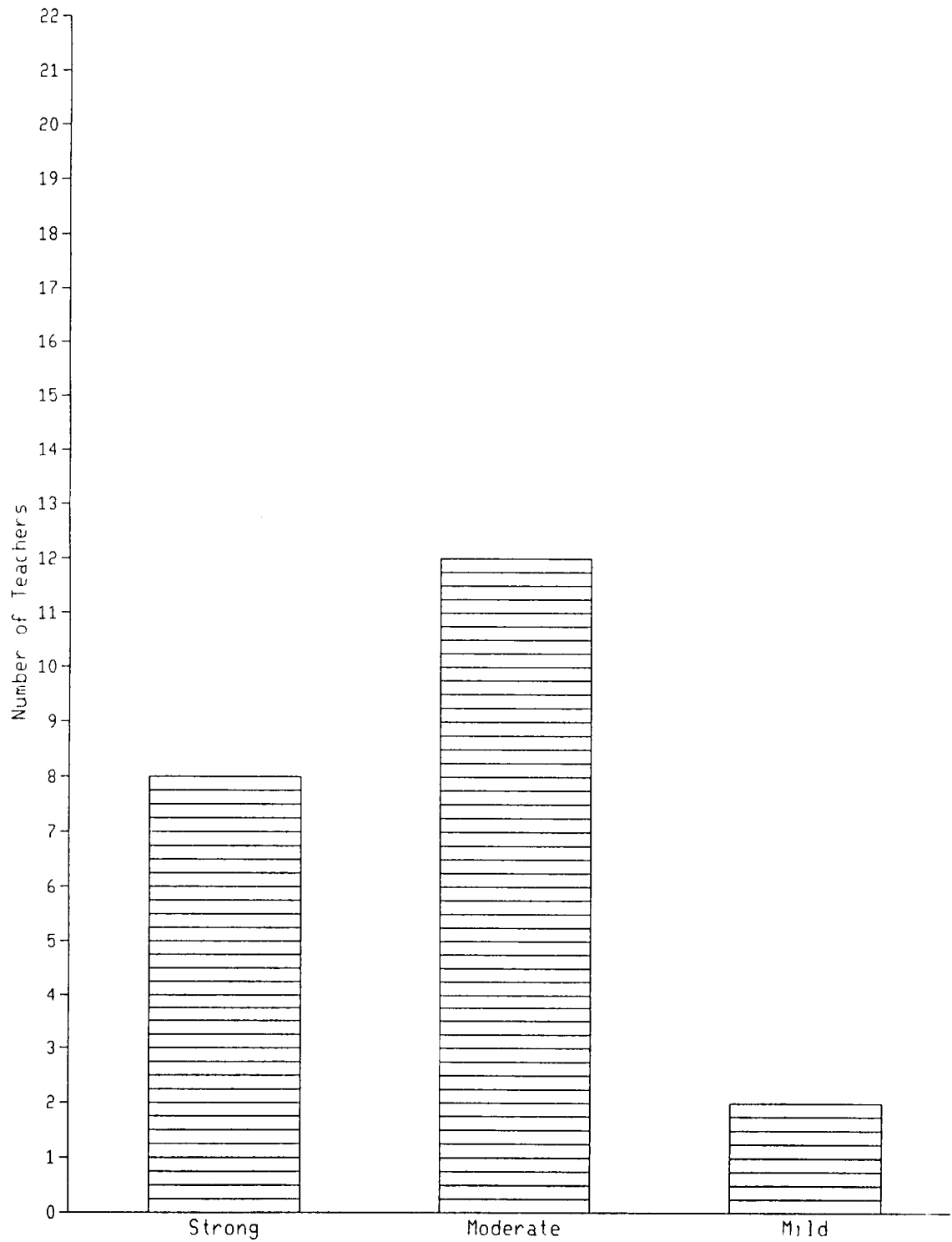


Figure 7. Graphic Representation of Teacher Tactual Preferences.

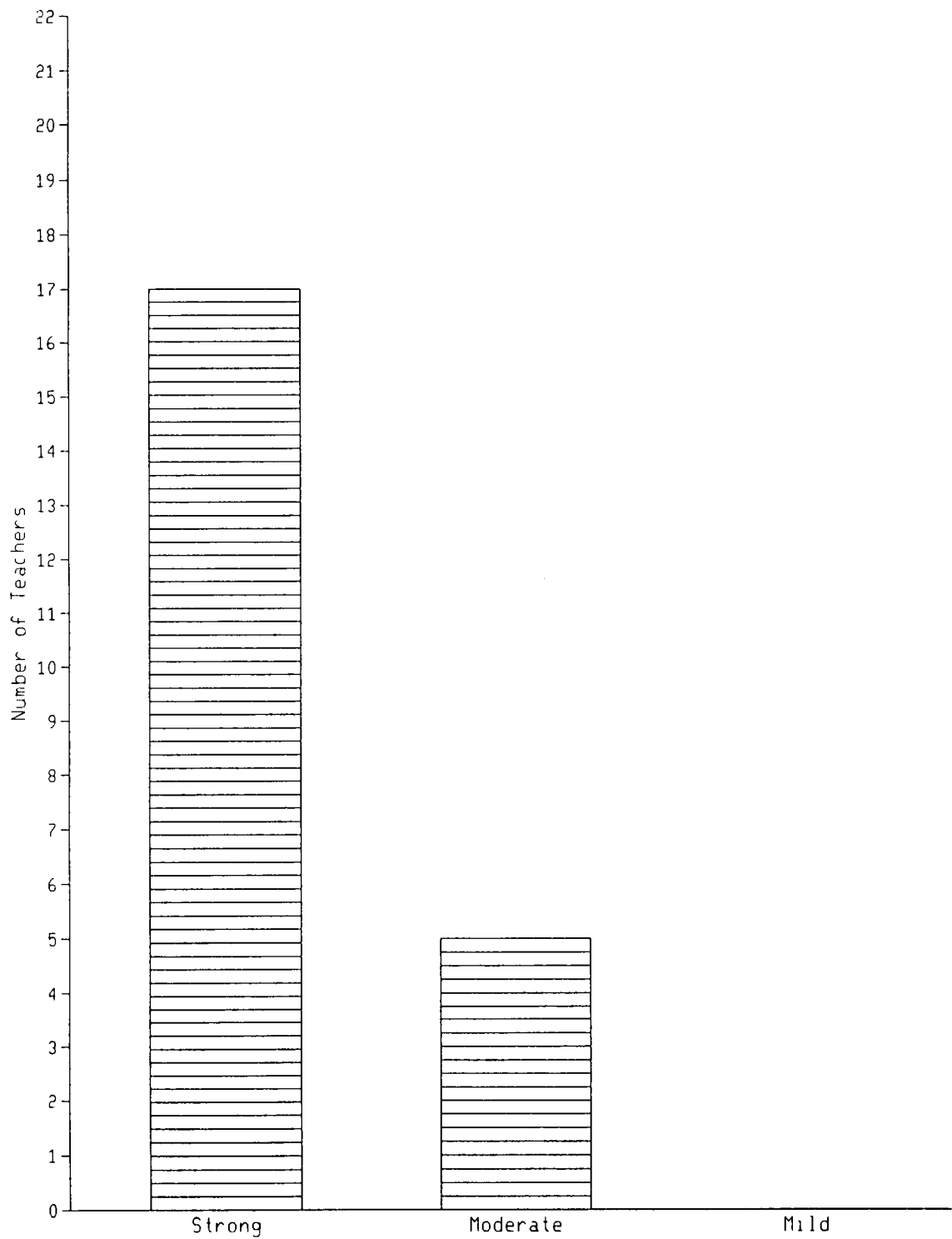


Figure 8. Graphic Representation of Teacher Kinesthetic Preferences.

Results from The Gregorc Style Delineator provided four scores for each teacher, one in each of the four mediation channels. Scores ranged from 14 to 38. Figure 9 illustrates the range of scores. Fourteen teachers scored in the high range (27-40) for the Concrete Sequential channel and eight teachers scored in the intermediate range (16-26). For the Abstract Sequential channel, six teachers scored in the high range, fifteen teachers scored in the intermediate range and one teacher scored in the low range (10-15). The scores for the Abstract Random channel included seven teachers in high range and fifteen teachers scored in the intermediate range. The Concrete Random channel included five teachers in the high range, fifteen teachers in the intermediate range and two teachers in the low range. Several teachers scored high in more than one mediation channel. Figure 10 shows the relationship between multiple high scores and grade levels taught by individual teachers.

When the numerical score on The Delineator was high (27-40) in one of the channels, it indicated that the mediation qualities of that channel were powerful means of transaction for the person. An intermediate score meant that one had moderate mediation ability and capacity to transact in the channel indicated. A lower numerical score indicated least powerful mediation qualities.

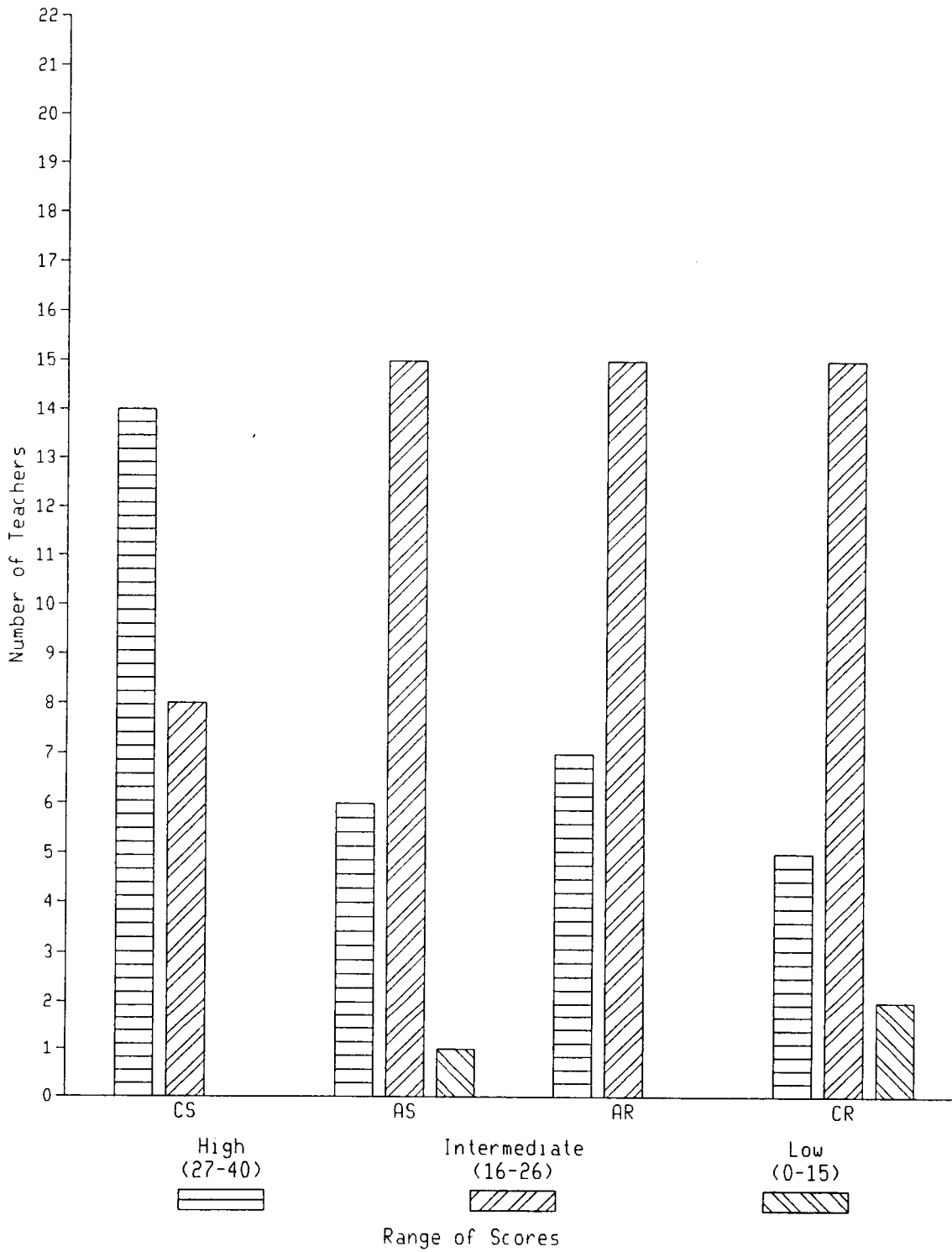
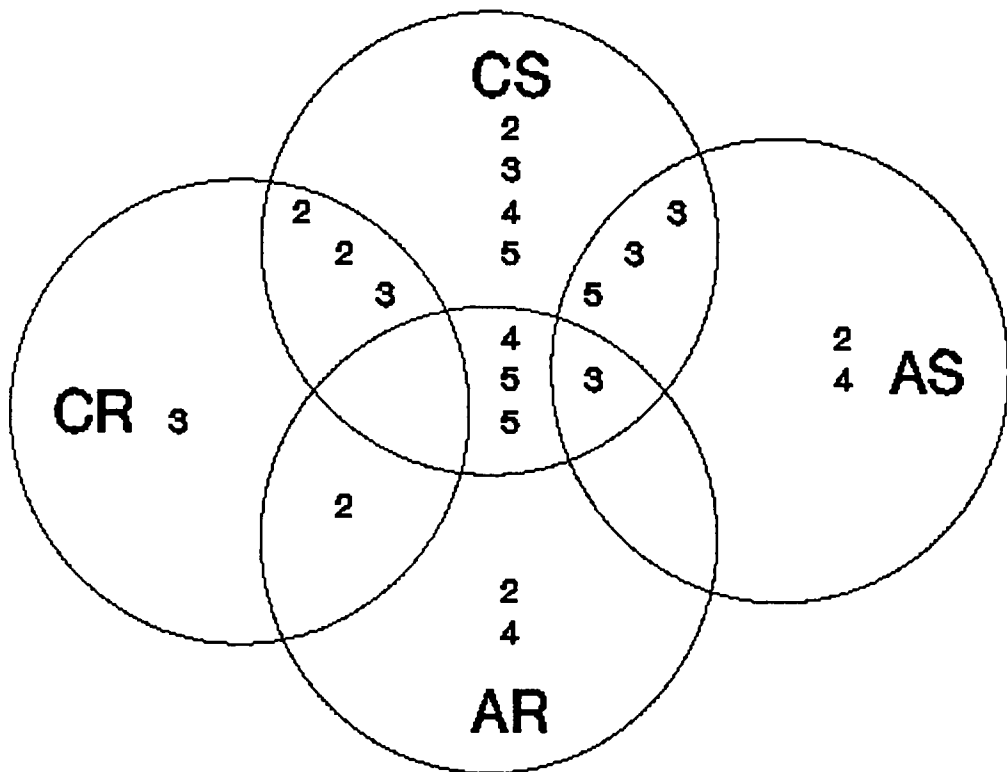


Figure 9. Graphic Representation of Gregorc Mind Styles.



Each number represents the grade level taught by an individual teacher.

Two teachers of grades four and five did not score Within the high range in any of the four styles.

Figure 10. Gregorc Style Delineator High Range.

CHAPTER 5

CONCLUSION

Summary and Discussion

Most students, regardless of background, are capable of learning. Many, however, do not progress at the same pace or learn in the same ways. Each individual learns differently from every other one and the success of education depends on adapting teaching to the individual differences of the pupils involved.

It is believed that children who have experienced difficulty in school generally, and in learning to read, specifically, did so because they were not being taught in ways that respond to how they learn.

One very promising tool selected by a number of teachers in an effort to help students succeed has been the use of learning style diagnoses in designing reading programs. According to Carbo (1987), "The research on reading styles has made one thing clear: reading achievement generally has depended on how well the instructional program accommodated a given student's natural reading style."

Just as learners were found to have their own styles and their own sets of distinctive behaviors (which served as indicators of how they learned from and adapt to their

environment), so teachers were also found to have their distinctive teaching styles. Gregorc identified four distinctive styles that described the ways teachers and other individuals perceived and ordered information. The unique characteristics of teachers whose dominant styles were Concrete Sequential, Abstract Sequential, Abstract Random, and Concrete Random were believed to have influenced the methods and materials they elected to use in instruction.

A primary purpose of this investigation was to examine the relationship of matches and mismatches between selected learning style characteristics of pupil and teachers in relation to student achievement in reading comprehension. The characteristics under investigation were perceptual preferences for tactual and kinesthetic stimuli. The study also examined the reading comprehension achievement between boys and girls, as well as reading comprehension achievement among grade levels. The relationship between perceptual preference and gender was also investigated. An additional purpose of the study was to determine if The Reading Styles Inventory and The Gregorc Style Delineator had elements in common.

Student data were collected from 120 subjects in grades two, three, four, and five, from existing school records that included reading comprehension scores from the

1990 spring administration of The Stanford Achievement Test and reading style profiles from the fall 1989 administration of The Reading Styles Inventory. Both instruments were administered to students as part of their remedial reading program at Alcoa Elementary School during the 1989-90 school year.

Twenty-two state certified and state supported teachers were administered The Reading Styles Inventory to identify perceptual preferences. They also completed The Gregorc Style Delineator in order to determine their dominant style of processing and ordering information.

No significant difference was found in the mean reading comprehension scores of those students whose perceptual preferences matched those of their teachers' perceptual preferences. A significant difference was found in the mean reading comprehension scores of boys and girls with girls scoring higher. This finding was consistent with the vast body of literature in gender differences and reading achievement. No significant difference was found among the grade level mean reading comprehension scores of students in grades two, three, four, and five. No significant relationship between mean achievement scores among grade levels was found. Also, there was no significant relationship found between perceptual preference and gender of the respondents. The exploratory

design of the investigation permitted a general comparison of The Reading Style Inventory and The Gregorc Style Delineator. The instruments were found to have no elements in common. Each instrument was based on a definition of style that differed from the other. The research, methodologies and uses for the information each instrument yielded also differed in The Reading Styles Inventory and in The Gregorc Style Delineator.

An increasing number of studies support the premise that reading performance is strongly related to perceptual abilities (Morency & Wepman, 1973) and that achievement improves when youngsters learn through their perceptual strengths. However, few studies have examined reading achievement in relation to the match or mismatch of students' and teachers' perceptual preferences. The purpose of this study was to explore questions related to reading achievement and perceptual preferences. The following questions guided the investigation:

1. Do students whose perceptual preferences match those of the reading teacher show greater achievement in reading comprehension than students whose perceptual preferences are mismatched with those of the reading teacher?

2. Is there a significant difference in the mean achievement scores in reading comprehension between boys and girls?
3. Is there a significant difference in the mean achievement scores in reading comprehension among students in grades 2, 3, 4, and 5?
4. Is there a significant relationship between perceptual preference and gender of the respondent?
5. Do The Reading Style Inventory and The Gregorc Style Delineator have elements in common?

Though the findings of a number of studies (Carbo, 1980; Jarsonbeck, S., 1984, cited in Dunn et al., 1989; Koon, D., 1985, cited in Dunn et al., 1989; Wheeler, 1980; and Wheeler, 1983) revealed that when youngsters were taught with instructional resources that both matched and mismatched their preferred modalities, they achieved statistically higher test scores in modality matched rather than mismatched treatments. The findings of the current study for question 1 indicated no significant difference in the reading comprehension scores of students whose perceptual preferences matched those of their teachers' versus the scores of students whose perceptual preferences did not match those of their teachers' (43.36 versus 42.98). The findings of this question were examined to

identify possible reasons for the results that differed markedly from the studies cited in the literature.

In this investigation, individual perceptual preferences determined whether students were matched or mismatched with their teachers' perceptual preferences. Students were considered matched when their reading style profiles indicated the same degree of tactile and kinesthetic preference (strong, moderate, or mild) as was indicated on the teachers' profiles. One difference in the present study and the studies cited in the literature is related to the variables selected for matching. Previous studies matched the reading style elements of students' perceptual preferences with instructional treatments (methods and materials) rather than matching preferences common to student and teacher. Another possible explanation for the finding of no significant difference may be attributed to the choice of elements selected for study. Of the twenty-three reading style elements, perhaps there is one or a combination of several elements that more directly related to reading achievement when shared by both the student and the teacher. Tactile and kinesthetic preferences may have been less critical to the reading process than other elements. In addition, it should not be assumed that because a preference was shared by teacher and

student that reading instruction in the classroom included tactile or kinesthetic methods or materials.

In analyzing the data to address question 2, a significant difference was found when the mean reading comprehension score for girls (48.47) exceeded the score for boys (40.09). This finding was consistent with the vast body of literature that exists on gender differences and reading achievement. Additional t tests were performed on the matched and nonmatched mean scores of boys and girls to determine where the significant difference might be found. The significant difference was found between the boys and girls who were nonmatches with their teachers, $t = 2.816$, $p > .005$. The table $t = 1.658$, 85 degrees of freedom, one-tailed test, .05 alpha level.

A number of hypotheses have been proposed to explain why differences in reading ability and achievement exists. Some hypotheses dealt with methods and materials while some hypotheses suggested differences in interest, attitude and cognition, and psychological differences. Other hypotheses pointed to sex role socialization, the gender of the teacher, and the difference in the treatment of boys and girls. In this investigation, the possibility existed that boys might have failed to be motivated by a feeling of the importance of reading as presented by a female teacher. Twenty-one of the twenty-two teachers in the study were

female. Other factors considered in the poor performance of the boys included the possible negative feeling boys might have had about being in a remedial reading program. The spring of the year might also have been a factor since many boys in the Alcoa District participated in baseball leagues during spring months. Many boys may have found it difficult to concentrate and attend to test taking.

In a further attempt to identify factors that might have influenced reading comprehension achievement, an analysis of group mean scores by grade level was performed to respond to question 3. No significant difference was found among the four grade levels. Grade level did not appear to be a critical factor in reading comprehension achievement. Additional t tests were used to compare the mean scores of students at each grade level who matched and who were mismatched with their teachers on tactile and kinesthetic preferences. No significant difference was found in any of the four grade levels.

In answer to question 4, no significant relationship was found between perceptual preference and gender. They (perceptual preference and gender) appeared to be unrelated to reading comprehension achievement in this particular study. This finding was especially surprising given the research that found boys to be more aggressive, active and energetic than girls (Kohlberg, 1966). It was expected

that the percentage of boys expressing strong, moderate, and mild preferences for tactual and kinesthetic stimuli would be greater than the percentage of girls expressing similar preferences. However, the greater percentage of female students (as compared to the percentage of male students) had strong and moderate tactile preferences. More males than females tended to have moderate kinesthetic preferences and mild tactile preferences. Having a preference of tactile activities suggested that respondents preferred to learn with their hands through manipulation. Kinesthetic preferences implied the preference to involve the whole body in experiencing and doing such as taking a trip, interviewing or dramatizing. At Alcoa Elementary, both boys' and girls' preferences ranged from mild to strong. Consideration has been given to the notion that students might not have had prior experience in a classroom where tactile and kinesthetic methods and materials were used to introduce new information. According to Barbe and Swassing (1979), tactile and kinesthetic instructional strategies have historically either been ignored or used only for reinforcement for underachieving youngsters.

In examining The Reading Style Inventory and The Gregorc Style Delineator for common elements, comparisons were made of definitions, basic beliefs, and uses for the information gleaned from each instrument. Both instruments

purported to measure "style," however, each defined it differently from the other. Gregorc referred to style as the way an individual processes and orders information. Carbo considered style the way an individual responded to the twenty-three elements of reading (style). The Gregorc model had specific intentions and goals which revolved around self-knowledge, self-development, increasing consciousness and the unfoldment of one's ability to relate to multiple environments. Certain facts and assumptions undergirded this instrument. Among them were the possession of innate abilities and predispositions for space and time dimensions, relationships, and free will. The primary use for the information collected from the RSI was to identify the elements of reading style so that appropriate methods, materials and modifications could be provided for individual learners. An additional use for the RSI data was to assist students to recognize their own learning styles so that they could make useful decisions regarding their approaches to selecting and processing information. The Reading Style Inventory and The Gregorc Style Delineator were found to have no elements in common. The instruments conflicted in definition, in psychological construct, in values, and in procedures as well as in beliefs, philosophies and organizational designs.

Conclusions

The findings of this investigation suggest that the matching of students' and teachers' perceptual preferences was not related to the reading comprehension achievement scores of students at Alcoa Elementary School. However, the use of learning style instruments should not be discounted based on this finding alone. It was possible that significant results might have been achieved with the matching of other learning style elements and with the matching of combinations of learning style elements. An experimental design with a focus on individual scores as opposed to group mean scores might also have yielded a different result.

It was also concluded that in elementary grades, females continued to achieve in reading at higher rates than did their male counterparts. At Alcoa Elementary School, it was possible that the way female teachers structured the classroom situation and interacted with girls was positively correlated to girls' achievement in reading. Girls may have had the opportunity to see more women reading (modeling desired and valued behaviors) than boys had the opportunity to see men reading. According to Harris (1976) and Bank et al. (1980) some males regarded reading as a feminine activity of little value.

An additional conclusion suggested by this investigation was that student grade level assignments tended to be unrelated to reading comprehension achievement. One reason that grade level appeared to be unrelated to reading achievement may have had to do with curricular materials. Until recently, reading teachers utilized a basal program that emphasized sequenced skills and objectives. Many of the same skills were taught at each grade level and the material tested was the material that was taught. The content of tests did not differ enough among grade levels for differences to be discerned.

Perceptual preference and gender also tended to be unrelated to reading comprehension achievement in this investigation. At Alcoa Elementary School both boys' and girls' preferences ranged from mild to strong with female students having a greater percentage than male students of strong and moderate tactile preference.

With regard to The Reading Style Inventory and The Gregorc Style Delineator, it was concluded that the instruments measure style in very different ways and have no elements in common.

Recommendations

Based on the findings of this investigation it is recommended that future studies:

1. examine other elements of learning style singularly and in combinations in relation to reading achievement.

2. examine the reading achievement of males versus the reading achievement of females in elementary reading classes when the teacher is a male.

3. replicate this study of the match/mismatch of perceptual preferences in relation to reading achievement with modifications in the design and methodology.

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APPENDIXES

APPENDIX A

INSTRUMENTS

Inclusion of the instruments has been prohibited by the
publishers.

The Gregorc Style Delineator is available from:
Gregorc Associates
P.O. Box 351
Columbia, CT 06237-9405

The Reading Styles Inventory is available from:
Learning Research Associates
P.O. Box 39
Roslyn Heights, NY 11577
1-800-331-3117

Stanford Achievement Tests are available from:
Tennessee State Testing and Evaluation Center
The University of Tennessee
1914 Andy Holt Avenue
25 HPER Building
Knoxville, TN 37996-1530

APPENDIX B

PERMISSION TO USE INSTRUMENTS

DR. MARIE CARBO
403 Titus Way
East Williston, New York 11596

October 17, 1989

Dear Ms. Murphy,

I would be delighted if you would use the Reading Style Inventory as part of your research, and you have my permission.

I'm enclosing information for you about upcoming seminars, and a Reading Styles Newsletter. I am collecting all research on The RSI, and would deeply appreciate a copy of your work when it is finished. Learning Research Associates will cover all duplication and mailing costs.

I've also enclosed some research guidelines that you may find useful.

Sincerely,

Marie Carbo



GREGORC ASSOCIATES, INC.

15 Doubleday Road
Columbia, Connecticut 06237-9405
(203) 228-0093

TO Ms. Jacquelyn Murphy
301 North Chilhowee Drive
Knoxville, TN 37914

DATE October 11, 1989
SUBJECT

Deer Ms. Murphy:

Enclosed are a specimen of the Research Edition of the Gregorc Style Delineator, two Request Forms, a Statistical Summary and other selected materials.

If you wish to use the Research Edition and agree to the conditions on the Request Form, please sign one copy and return it along with a Statement of the Problem. Also tell us the number of instruments you will need.

This edition comes in packets of 100 instruments for \$16.95 plus postage and handling per packet. If you have any questions, please let me know.

Sincerely,

Anthony F. Gregorc, Ph.D.
President

AFG/dfg
Encs.

REQUEST FOR RIGHT TO PURCHASE AND USE
THE GREGORC STYLE DELINEATOR - RESEARCH EDITION

I hereby request permission to obtain the Research Edition of the Gregorc Style Delineator. In requesting this permission, I do so under the following conditions and certify that:

1. The instrument will be used for bonafide research only (not as a substitute for the Regular Edition).
2. I will provide Dr. Anthony F. Gregorc with an Abstract of my Proposal and/or a statement of the problem and hypotheses.
3. I will provide Dr. Anthony F. Gregorc with an Abstract of the results of my findings.
4. I will not display the Research Edition of the Gregorc Style Delineator in its entirety in the body or Appendix of the study document. A description of the instrument and a specimen column of words is acceptable, and
5. I will administer, interpret, and use the Research Edition of the Gregorc Style Delineator I am purchasing in accordance with the Administration Manual and descriptors and ideas described in An Adult's Guide to Style and Inside Style: Beyond the Basics.

April 11, 1990

Date

Gregory C. Murphy

Signature

August 1990/December 1990

Anticipated Completion Date of Study

NOTE: This form must be accompanied with the Abstract of your Proposal. Upon written approval from Dr. Anthony F. Gregorc, the instruments will be released to you for this study. Please sign both copies of the Request Form, retain one for your files and return the other to this office.

January, 1987

Jacquelyn Murphy
301 N. Chilhowee Drive
Knoxville, TN 37914
April 11, 1990

Dr. Anthony F. Gregorc
Gregorc Associates, Inc.
15 Doubleday Road
Columbia, CT 06237

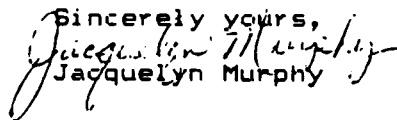
Dear Dr. Gregorc,

Enclosed you will find a copy of the statement of the problem and hypotheses that are a part of my doctoral proposal. I have reviewed the conditions outlined for the use of your instrument, The Gregorc Style Delineator and have affixed my signature indicating my compliance with those conditions.

Please send to me the following:

- 1 Sample set
- 1 Technical Manual
- 1 pkg. of 100 research instruments.

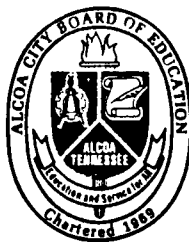
Many thanks for your immediate attention to my request.
Invoice will be paid in full upon receipt.

Sincerely yours,

Jacquelyn Murphy

APPENDIX C

PERMISSION TO RESEARCH ALCOA

ALCOA CITY SCHOOLS



Alcoa City Education Building
Faraday Street
Alcoa, Tennessee 37701
(615) 984-0531

"committed to excellence through
comprehensive education"

November 3, 1989

Ms. Jacquelyn Murphy
301 N. Chilhowee Drive
Knoxville, TN 37914

Dear Jacquelyn:

Your request for permission to conduct doctoral research in the Alcoa City School System has been considered. Your proposed study appears to have merit and the findings might prove useful in the Chapter I Program of the Alcoa City School System.

Permission is granted with the understanding that findings will be shared with participants, administrators and other interested persons when those results become available. Good luck in your endeavor.

Sincerely,

Jane Qualls
Supervisor of Instruction, K-12

JQ:rh

APPENDIX D

INFORMED CONSENT FORM/THANK YOU NOTE

Dear Teacher,

You are invited to participate in a study I am conducting to examine the relationship between student and teacher perceptual preferences in relation to student achievement in reading comprehension. The purpose is to explore the perceptual preferences of students and teachers to see if differences exist in student achievement when students and teachers perceptual preferences are matched or mismatched.

This study will provide data to determine if student placement based on perceptual preference is worthy of consideration. Although the study may have no direct benefits to you at this time, your participation will provide interesting and valuable information concerning the various issues involved with ways people learn to read and to process information.

Should you elect to participate, the time commitment will not exceed fifteen minutes and you will be asked to complete two instruments. The Reading Styles Inventory for Adults requires responses to statements that describe reading behaviors while The Gregorc Style Delineator requires respondents to rank order sets of words. There are no known risks to these testing procedures.

Your identity will be kept confidential. Only the investigator will have access to your score sheets, which will be given to you once the study is completed. All results will be encoded with subject numbers, without individual identities, and any possible identifying items will be disguised or deleted.

If you have any questions about the research, either now or later, please contact Jacquelyn Murphy, 301 N. Chilhowee Dr., Knoxville 37914, or call 524-9951. Your participation in this study is voluntary, and you may refuse to participate. You may withdraw at any time during the testing without penalty.

I have read and understood the explanation of the study and agree to participate.

Name

Date

Signature

301 N. Chilhowee Drive
Knoxville, TN 37914
June 15, 1990

Dear Teacher:

Thank you for participating in my study regarding learning style elements and reading achievement. I appreciate you taking the time to complete the instruments.

Sincerely,

Jacquelyn Murphy

VITA

Jacquelyn Osborne Murphy was born in Jackson, Tennessee, on April 4, 1955. She attended elementary school in Morristown, Tennessee, and was graduated from Morristown Hamblen High School West in June 1973. The following August, she entered Westminster Choir College, Princeton, New Jersey.

In May of 1977, she received a Bachelor of Science degree in elementary education from Middle Tennessee State University. Following graduation, she accepted a teaching position in the Chattanooga Public School System. In 1978, she relocated to Knoxville, Tennessee, where she was employed by Knoxville City Schools.

Mrs. Murphy was awarded the Master of Science degree from the University of Tennessee, Knoxville, with a major in educational administration and supervision, May 1981. In the winter of 1986, she returned to the University and entered the doctoral program in education. She received the Doctor of Education degree with a major in administration and supervision in December 1990.

Mrs. Murphy is a member of Phi Delta Kappa and is currently serving as president of the Morristown Alumnae Chapter of Delta Sigma Theta Sorority, Incorporated. She has served as an Elementary Supervisor and Director of

Chapter I for Johnson City Schools. She is presently employed by Alcoa City Schools as Chapter I Coordinator and Reading Consultant.