Comparative Analysis of Learning Styles of Reading Compensatory and Non-Compensatory First and Second Graders

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COMPARATIVE ANALYSIS OF LEARNING STYLES
OF READING COMPENSATORY AND NON-COMPENSATORY
FIRST AND SECOND GRADERS

THESIS

Submitted to the Graduate Committee of the
Department of Curriculum and Instruction
Faculty of Education
State University College at Brockport
in Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Education

by
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ABSTRACT

This study investigated the learning styles of two diverse groups of first and second graders, compensatory and non-compensatory students. Sixty children were given the Learning Style Inventory: Primary Version. A Chi-square Test of Independence was determined for each of 12 learning style components in order to ascertain differences in learning style between good and poor readers. Significant results were found between groups for the learning style elements of temperature, structure, and motivation. The learning style element of perception was indicative of a trend at the 0.10 level. Other elements, though not statistically significant in terms of differences between good and poor readers at the primary level, did indicate similarities in how these children preferred to learn.
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Chapter I

Statement of the Problem

Purpose of the Study

The purpose of this study was to determine the learning style elements important to a selected group of first and second graders. The subjects of the study were further identified as reading compensatory and non-compensatory students. A secondary purpose was to compare the compensatory and non-compensatory groups in terms of their preferred learning styles.

Question of the Study

This study was a descriptive analysis of the similarities and differences in learning style between two groups of primary students who differ in reading ability. For the purposes of this research, the two groups were identified as compensatory and non-compensatory. The data collected from sixty first and second graders were analyzed to discover an answer to this question: Is there a significant difference between learning styles of the two groups, compensatory and non-compensatory?
Need for the Study

The knowledge that learning style is an important aspect to be considered in individualizing instruction is receiving wide-spread recognition today. The realization that we all learn in different ways suggests the attention that educators should give to diagnosing the unique learning style of their pupils. It is their future responsibility to adapt instruction to meet these differing needs in order that students may achieve at their maximum level.

Because of the emerging data, it is important to identify learning style elements that affect academic achievement so that teachers can diagnose and then prescribe for important individual differences. (Zenhausern, Dunn, Cavanaugh, & Eberle, 1981, p. 36)

Teaching through learning style significantly increases academic achievement as evidenced by a number of studies. For example, Shea (1983), who examined the learning style element of design (that is, whether a person prefers to work in a formal or an informal atmosphere), found that ninth grade students achieved statistically significantly higher scores on reading achievement when matched with their preference for a formal or informal design. Other studies have found similar increases in achievement (Carbo, 1980; Krimsky, 1982; Pizzo, 1981; Urbschat, 1977; White, 1980).
These findings have further substantiated the need for determining the learning style preferences of students.

The review of the literature examined numerous studies which addressed the importance of learning style as a factor in educating children. A number of assessment instruments were used by researchers to determine the learning style of individuals, ranging from the very young to adults. Most of these instruments, however, have been developed to assess elementary students and older. For example, the Learning Style Inventory (LSI) by Dunn, Dunn and Price (1979) is geared for grades three through twelve.

Those who have looked at pre-school or primary level students have relied on teacher assessment of perceptual style or perceptual tests for the most part. Research needs to be conducted at the primary level to ascertain student learning styles. It is extremely important that children in the early years of their education be given the opportunity to achieve their potential. This can be facilitated if instruction can be matched to their learning style, including all of the environmental, sociological, emotional, and physical components important to these learners.
Definitions

Learning Style

Regardless of age, IQ, race, sex, or socio-economic background, human beings tend to learn through their strengths and to avoid their weaknesses. How we learn--our 'style'--depends on our 1) environment 2) emotionality 3) sociological preference 4) biological traits and 5) psychological inclinations. (Dunn, 1982, p. 30)

For example, a person's learning style could include preferences for bright light while studying, and a casual atmosphere (important environmental components). He or she could be self-motivated, preferring to direct his or her own activities (important emotional components). This individual could also prefer to work alone or with an adult (important sociological preferences), and be a visual learner who works best in the mornings (important physical elements).

Cognitive Style

Cognitive styles are "information processing habits representing the learner's typical mode of perceiving, thinking, problem solving and remembering" (Messick, cited in Keefe, 1979, p. 8). Cognitive styles deal with the process of cognition, that is how information is being processed, and this process can be divided into two general areas: reception styles, and concept formation and retention styles. For example, a person may be field independent,
able to focus his or her attention and possess a flexible style which enables him or her to concentrate on the task at hand (reception styles). An individual may also exhibit a reflective nature, an analytic style, and a tendency to over-generalize (concept formation and retention styles).

Important Element - This is an element of learning style which is required or preferred by an individual.

Compensatory - In the school district where this study was conducted the decision to define a student as in need of compensatory (remedial) services is a total decision-making process, based on teacher recommendation, scores on a criterion-referenced test and the Woodcock Reading Achievement Test, and whether the child was in the program the previous year. Both Federal and State funds provide for the program (See PSEN and Chapter I following). Compensatory readers are also referred to as poor readers in this study.

Non-compensatory - These are students who are not in need of compensatory (remedial) services. Non-compensatory readers are also referred to as good readers in this study.

Chapter I - Financial Assistance to Meet Special Educational Needs of Disadvantaged Children of the "Education Consolidation and Improvement Act of 1981" (ECIA). This program was formerly known as Title I of the "Elementary
and Secondary Act of 1965" (Title I ESEA). Instruction in reading must be different in terms of materials, techniques, and grouping. Small groups no larger than eight are the norm and the teaching assistants provide high interest materials with the emphasis on specific skills. Chapter I compensatory services do not supplant the child's developmental program but are supplemental to it.

**PSEN** - Pupils with Special Educational Needs, Chapter 253 of New York State Educational Law, 1974. This program identifies very early those students who will probably have difficulty graduating from a public school in New York State. It provides a more intense learning situation than Chapter I. Reading specialists either go into the classroom and team with the teacher providing consulting and diagnostic services, or meet with small groups or individuals in the reading center. Children with more serious needs generally are identified as PSEN and are served by a reading specialist.

**LSI** - Learning Style Inventory (Dunn, Dunn and Price model)

**LSI: P** - Learning Style Inventory: Primary Version (Perrin model)
Limitations of the Study

The results of this study are limited by the fact that the instrument used to assess learning styles is in the experimental stage and is still being tested to establish its reliability and validity. The study was further hampered by the lack of teacher input in terms of observation of individual learning styles given the size of the sample and the time constraints.

Summary

The importance of learning style in relation to academic achievement is well-founded in the literature. Instruction, if correlated to individual learning styles, should have a favorable influence on performance.

This study was proposed to identify and compare learning styles of reading compensatory and non-compensatory primary students. The data collected were analyzed to determine similarities and differences between the two groups.
Chapter II

Review of the Literature

Purpose of the Study

This study was proposed to examine the learning style preferences of first and second graders. These students were classified as compensatory readers and non-compensatory readers. Similarities and differences between the two groups were a primary focus of this study.

This investigation of the literature was concerned with a definition of learning style, the differences between learning style and cognitive style, the importance and implications of learning style in the classroom, and the relationship between learning style and reading achievement. Finally, an analysis of the various diagnostic tools used for determining individual learning style was examined.

Learning Style

Researchers cannot agree upon a single definition of learning style. Canfield and Lafferty allude to conditions, content, modes and expectations; the Dunns discuss stimuli and elements; Gregorc refers to mind-qualities and dualities; Hunt emphasizes conceptual level; Kolb stresses hereditary equipment, past experience and the environment while Schmeck focused on deep and shallow
information processing (Dunn, DeBello, Brennan, Krimsky, and Murrain, 1981). Nations (cited in Eiszler, 1982) defines learner style as integrating sensory orientation, responsive mode and thinking pattern. Thies examines learning style in terms of brain-behavior (Keefe, 1979). These are theoretical characteristics of learning styles which vary with the perspective of the author.

Bennett (cited in Holland, 1982) defined learning style as a student's preferred way of learning. He further remarked, "It represents a cluster of personality and mental characteristics that influence how a student perceives, remembers, thinks and solves problems" (p. 8).

Since there are a number of different views of what constitutes learning style, it is probably only safe to conclude that researchers agree that human beings are individuals who are unique, therefore, they have preferences as to what way of learning is most productive and comfortable for themselves.

Even the term "style" needs explaining. Fischer and Fischer (1979) state that style is not to be confused with method because the method a person favors is colored by his/her style. Lecturing is a method, but one lecturer's style will differ from that of another. In addition, style "refers to a pervasive quality in the behavior of an individual, a quality that persists though the content may change" (p. 245).
Since the focus of this study revolves around the Dunn model of learning style, an appropriate definition would be that "Learning style is the manner in which many different elements from five basic stimuli affect a person's ability to absorb and retain" (Dunn, Cavanaugh and Quinn, 1980, p. 1).

Dunn and Dunn (1977) identified and defined what they considered to be the basic elements of learning style. They are grouped into five classes or stimuli with several sub-elements as follows:

**Environmental Components**

- **Sound:** the need for quiet or the need for some background noise while studying
- **Light:** preference for a brightly lit environment or a dimly lit environment
- **Temperature:** preference for either warm or cool temperatures when studying
- **Design:** preference for working in a formal atmosphere or an informal atmosphere

**Emotional Components**

- **Motivation:** the desire to achieve academically
- **Persistence:** the inclination either to complete tasks or to break from them, planning to return to them later
- **Responsibility:** the desire to do what one thinks one ought to do
- **Structure:** the need for either specific directions or a great deal of latitude when involved in completing tasks
Sociological Components

Peer-oriented: preferring to work with a friend or group
Self: preferring to work alone
Adult-oriented: preferring to work with an adult
Varied: preferring to work alone or with others

Physical Components

Perceptual: Auditory - preferring to listen, to concentrate on what one hears when learning
Visual: preferring to learn by reading or observing
Tactile: preferring to underline, take notes, keep hands busy while working
Kinesthetic: requiring whole body movement when learning

Intake: requiring or not requiring intake in any form while studying

Time: preferring to study or work at a certain time of day

Mobility: requiring frequent breaks in order to move about, in contrast to sitting still for long periods of time when studying

Psychological Components

Analytic/Global: sequential learning (analytic) vs. gestalt learning (global)

Cerebral Dominance: left hemispheric learning (often analytic learning) vs. right hemispheric learning (spatial learning)

Impulsive/Reflective: preferring to call out answers without considering various options (impulsive) vs. waiting and considering (reflective) (Dunn, 1983 a)
Most people have between six and fourteen elements that are important to them; some have as many as 17 or 18. No one is affected by all of the elements. When an element is unimportant, a person is unaware of any reaction to it and thus cannot respond knowledgeably to questions about it. If an element is important, though, a person can verbalize his/her preferences and dislikes. Extremely important elements are called "strong preferences" and these can be positive or negative. One person may find any sound unacceptable while studying; another may require some background noise in order to concentrate. Both of these people have strong preferences for sound; one finding sound acceptable and the other unacceptable (Dunn, 1981). Sound would be an important component of either person's learning style according to the Dunn and Dunn model.

Learning Style and Cognitive Style

The disagreement about what constitutes learning style is compounded by the possible confusion between learning style and cognitive style. The terms are used synonymously and interchangeably in the literature but technically, they are not the same (White, 1983). Dunn (1981c) sees learning style and cognitive style as complementary but different:

Learning style is the way in which individuals respond to the environmental, emotional, sociological, and physical stimuli, whereas cognitive style—whether
it refers to field dependence/ or independence, global or analytic approaches, the "brain" concept of learning, or specific study skills--describes the ways in which the brain processes information. (p. 34)

According to current research, cognitive style is a subgroup of learning style, perhaps properly belonging within the psychological or brain-processing category (Dunn, 1981 c). The most recent design of the Dunn and Dunn learning style model has expanded to include a psychological component. Again, there are different viewpoints on this in the literature as Holland (1982) suggests that learners prefer specific learning styles dependent upon their own cognitive style. Keefe (1979), on the other hand, states that "Learning style, in fact, is the broader term and includes cognitive along with affective and physiological styles" (p. 4).

In Semple's (1982) review of learning style literature, he reports that researchers are more interested in learning style than cognitive style because cognitive style is more academic while learning style has more practical educational applications. A difference between cognitive style and learning style is the number of style elements considered. Cognitive style addresses just one element of style with two polar extremes; e.g. one is either field dependent or field independent. Learning style has many components and the absence of an element does not necessarily mean the presence of its opposite.
The Importance of Learning Style

Dunn, Dunn and Price (cited in Holland, 1982) have asserted that how a student learns is perhaps the most important factor related to his/her academic achievement. The realization also that we all learn in different ways suggests the attention that educators should give to assessing the unique learning styles of their pupils. It is their further responsibility to adapt instruction to meet these differing needs in order that students may achieve at their maximum level.

Because of the emerging data, it is important to identify learning style elements that affect academic achievement so that teachers can diagnose and then prescribe for important individual differences. (Zenhausern, Dunn, Cavanaugh and Eberle, 1981, p. 36)

Thompson (1979), Executive Director of the National Association of Secondary School Principals, states "The ability to map learning styles is the most important development in curriculum and instruction in a generation. It is the most scientific way we know to individualize classroom education" (p. 1).

Fiske (1981), recognizing the learning style differences in children, sees some of them doing better "in the presence of a record player and a cookie jar" (p. 1) and also sees schools incorporating a variety of learning options--noisy as well as quiet areas, structured vs. non-structured exercises, and adult-dominated and peer-oriented lessons.
Cheyney (1974) conducted a study with 120 elementary students in special education classes to test the reliability of the Carner Test of Learning Styles and its relationship to word recognition skills instruction. One of her conclusions was that teachers of learning disabled children with severe reading problems might do well to determine their pupils' learning styles before selecting a teaching method to use in beginning reading.

For low-achieving youngsters, the matching of learning style to instructional method can make the difference. Arbitrarily assigned instructional activities often result in failure. When such children are then assigned remedial tasks, often employing the same methods on a small group basis, the cycle continues (Dunn and Dunn, 1977). Gregorc (cited in Fiske, 1981) suggests that learning disabilities may develop because the child cannot adapt to the teacher's style or the environment and in effect are created by the educational system.

Price (1982) looked at the relationship between learning styles and learning disabled youngsters, and reported that research involving learning disabled students uncovered significant correlations in four to six variables of learning style in the Dunn and Dunn model. He concluded that "It is clear that students with learning disabilities have different learning style preferences than do students without learning disabilities" (p. 5).
Carbo (1982) states:

The tragic mismatching of reading programs and individual learning styles hinders learning, causing many youngsters to struggle, become frustrated and fail. As a result, thousands of students develop an aversion to reading, undergo years of extensive and costly remediation and too often drop out of school. (p. 126)

Some interesting anomalies have surfaced as a result of the research on learning styles. The element of perception is very important and it is estimated that only 20-30% of young children prefer listening as a way of learning. Forty percent of school children are visual learners and the rest prefer tactual, tactual/kinesthetic or tactual/visual modalities. Yet the emphasis in reading instruction is on phonics which directly meets the needs of barely one third of the students (Dunn and Carbo, 1979; Fiske, 1981).

Another physical element, time of day preference, may also be subject to mismatching of learning style and teaching method. Chronobiology is a science that examines the inner clock that all humans have. This discipline suggests that each individual is more alert and able to do his or her best work at certain times of day. Carbo (1982) studied reading achievement of second graders and found that only 28% preferred to read in the morning. Yet teachers traditionally schedule reading at that time. Virotско (1983) confirmed this
finding in her longitudinal study of 286 elementary students when she discovered that these children achieved significantly higher (.001 level) scores in reading and math when matched with their time of day preference which happened to be late morning and afternoon.

Lynch's (1981) research with time preference also yielded significant results, specifically reducing truancy among high school students when schedules were adjusted to meet time of day preference. Correlation between academic achievement and truancy was another result of this study.

Learning styles of students can also have an effect on self-concept or vice-versa. Students who are identified as being persistent, non-mobile and perceptually multi-faceted are most often valued by their teachers and will receive praise. As a result, their self-concept is increased (Dunn, Dunn, Price and Saunders, 1979).

Interest has been recently generated in relationships between learning style and brain-hemispheric preference (Dunn, Cavanaugh, Eberle and Zenhäusern, 1982; Levy, 1983) and has also provided insights into brain-processing activities. It has been found that the right and left hemispheres fulfill different functions and some of these correlate with certain learning style elements (Dunn, 1981 b). Sinatra (1982) states that
"Looking for preference through learning style assessment may be an even more powerful way to determine how students learn than identifying what the brain can/can't do during specific tasks" (p. 5). Levy (1982) agrees that people differ in their abilities. However, she says that "These differences, but not brain science, suggest that there might be different and optimal ways to teach different individuals" (p. 4). Future research is needed to ascertain if indeed there are relationships between cerebral dominance and learning styles.

**Learning Style and Reading Achievement**

Numerous studies have been conducted examining the influence learning style has on reading achievement.

Price, Dunn and Sanders (1981) looked at reading achievement and learning style characteristics in 85 elementary students in New York City schools and found that good and poor readers preferred certain environmental, sociological, emotional, and physical conditions. Poor readers were found to be adult-motivated, persistent and responsible, preferred to study in the late morning in a brightly-lit, informal environment, did not require mobility and were tactile-kinesthetic learners. Good readers exhibited nearly opposite preferences. They were found to be self-motivated, persistent and responsible, did not require food intake while studying, preferred dim light in a formal
environment, did not function well in the late morning, required mobility, and were not tactile-kinesthetic learners.

Murray (1980) tested junior high students' learning styles and compared their reading achievement. She found 27 significant differences in learning style between males and females, and good and poor readers.

Comparable studies of learning style characteristics of gifted students (Dunn and Price, 1980; Griggs and Price, 1980) revealed preferences for some sound while studying, formal design and visual, tactile or kinesthetic modalities. They were more persistent and less responsible, and more often self-motivated than their non-gifted peers. Irresponsibility could possibly be explained, the authors suggested, by their desire to be independent rather than conforming.

In terms of motivation, Kaley (cited in Dunn, 1980) found that in his work with sixth graders, those with higher reading levels had more independent learning styles. Lower reading levels correlated with a need for teacher-directed instruction and a more dependent learning style.

Research analyzing the relationship between the modality preferences of primary level students and reading performance indicated that when these children were instructed according to their preferred perceptual learning style
(auditory, visual or visual-tactile), they performed better on reading tasks (Carbo, 1980; Carbo, 1983; Scott, 1973; Urbschat, 1977).

Eiszler (1982), who administered the LSI to 170 ninth graders in his study, was looking for relationships among several variables. One of his findings was that "high achieving students have greater preferences for learning by reading than moderate and low achieving students" (p. 13). Visual modality appears to be important to both younger and adolescent learners as evidenced by this study.

Eiszler (1982) also reported that "Preferences of male and female students for a tactile/kinesthetic modality decreases from grade one to grade two" (p. 4) and "Preferences for auditory modality increased over grades one through twelve but only for female students" (p. 5). This finding may have some significance for primary teachers involved in beginning reading instruction. Identifying a student's preferred modality in the early stages of reading and adjusting teaching accordingly may have a positive effect on that child's reading progress.

Furthermore, Burton (cited in Semple, 1982) "found that when treatments were not matched with modalities, visual methods were more successful with primary children than auditory approaches despite the fact that the
youngsters had been taught phonetically" (p. 10).

In her study of kindergarteners, Carbo (1980) divided her subjects by their ability in visual and auditory perception. As a result of this division, children were placed in three modality groups (visual, auditory, no preference) and randomly assigned one of three modal reading treatments. Carbo's results concurred with other studies in that when children are taught through their modality strength, performance on word recall was increased.

Carbo (1983) also asserts:

that good readers prefer to learn through their visual and auditory modalities, whereas poor readers have higher preferences for learning tactually and kinesthetically. Also poor readers have difficulty shifting between and integrating auditory and visual stimuli. (p. 487)

She further states that poor readers' needs for a particular learning environment are not being met. She suggests that many poor readers need a structured reading program with some peer interaction and teacher encouragement and motivation; the environment should utilize the child's tactual and kinesthetic preferences in an informal, quiet reading situation. Teachers need to be sensitive to energy "highs" of these students and schedule those times to teach reading. Early morning may not coincide with their optimal learning time.
Urbschat's (1977) research found that modality strengths can be identified in first grade children and that when matched for modalities, the results were both superior and significant. And again, this study concluded that a visual or a combination of auditory-visual approaches was the most productive mode for the first graders.

Price (1980) sees young children following the growth curve in terms of modality preference. Younger children are more tactual/kinesthetic, followed by the development of their visual strengths, and it is not until grades five and six, that auditory strengths emerge.

In a longitudinal study of kindergarten pupils where extensive observations were compared with actual learning style inventory results (LSI: P), Crino's (1984) findings indicated that visual and tactile modalities were preferred by the majority of the kindergarteners. The kinesthetic mode was a secondary preference. An auditory perceptual preference was mentioned by only seven out of 50 children in the study. Crino also found that those pupils who experienced difficulty in the reading readiness program preferred tactile learning, and these children received remediation in reading in first grade. Though Crino's research did not find IQ to be a determining factor in
terms of reading readiness, it did indicate that children with low IQs preferred kinesthetic learning and were usually unmotivated.

To summarize the research on modality preference, educators seem to be in agreement that young children, especially kindergarteners and first graders, are more likely to be visual, tactile or kinesthetic learners. It is also extremely important to identify these strengths as well as other learning style preferences in order to provide the optimal individualized learning program that will facilitate their reading ability.

Learning Style Diagnosis

Using intelligence quotients as reliable indicators is questioned in the literature, as IQ is essentially only a measure of actual achievement. Two researchers dispute IQ as a reading achievement predictor: "Learning style is a better predictor of reading achievement than IQ" (Kaley, cited in Carbo, 1983, p. 486) while Dunn (1980) in reversing that statement, suggests that "Reading achievement is a statistically stronger and more efficient predictor of learning style than IQ is" (p. 598). In fact, only one element of learning style has been shown to correlate with IQ and that is persistence.
Other instruments such as achievement scores measure a child's academic progress, while personality tests explain behavior (Dunn and Dunn, 1977).

How then do we determine how best to teach children? The place to begin is with diagnosis of the child's learning style. "We all learn easily and remember better when we learn through our preferences" (Dunn, 1983 b, p. 31).

Dunn and Dunn identified and defined what they considered to be the basic elements of learning style. As mentioned earlier, they are grouped into five classes or stimuli as follows:

- Environmental: Sound, Light, Temperature, Design
- Emotional: Motivation, Persistence, Responsibility, Structure
- Sociological: Peers, Self, Pair, Team, Adult, Varied
- Physical: Perceptual, Intake, Time, Mobility
- Psychological: Analytic/Global, Cerebral Dominance, Impulsive/Reflective

The authors point to several research studies which demonstrate that students can identify their own learning style (Cafferty [cited in Dunn, 1981 c]; Copenhaver, 1979; Domino [cited in Dunn, 1981 c]; Dunn, 1980; Dunn, Dunn and Price, 1981; Farr [cited in Dunn, 1981 c]; Lynch, 1981; Pizzo, 1981; Reichmann and Grasha, 1974).

They also verified higher test scores, better attitudes, and increased efficiency when learning style preference
was matched with teaching methods (Dunn, Dunn and Price, cited in Keefe, 1979).

Other researchers dispute the ability of students to identify their own learning styles. Teacher observation is thought to be a better indicator of student learning style preferences, particularly at the elementary level (Davidman, 1981; Gregorc, 1979; Peterson, 1979). However, Crino (1984) and others find it advantageous to combine teacher observation with student assessment to more precisely define an individual's learning style.

Several instruments have been designed to assess learning style such as the Edmonds Learning Style Identification Exercise (Reinert, 1976); the Grasha-Reichmann Student Learning Style Scales (Reichmann and Grasha, 1974); and Your Style of Learning and Thinking (Torrance and Reynolds, 1978). The Dunn and Dunn model for diagnosing learning styles led to the development of the Learning Style Inventory (LSI), "a self-report instrument based on a rank ordering of characteristics for each of 104 items for use in grades 3-12" (Dunn and DeBello et al, 1981, p. 374). This inventory samples students' preferences in the environmental, sociological, emotional, and physical areas. An accompanying manual gives suggestions for instructional strategies based on those elements self-identified as being important to the student's learning style.
The LSI has been tested extensively over 14 years with at least 200,000 (Dunn, 1983a) school and university pupils and has proven to be both valid and reliable. In addition, consistency scores are computed to check on the accuracy with which each question is answered (Zenhausern, Dunn, Cavanaugh, and Eberle, 1981; Dunn and Debello, et al, 1981; Holland, 1982).

Cavanaugh (1981), Superintendent of Deer Park Community Schools in Cincinnati, selected the LSI as the vehicle for introducing the concept of learning styles to his staff and the student body of the high school. The subsequent program was so successful that when a group of high school students with their teacher visited France as part of an exchange program, they introduced learning style techniques to the host school!

**Learning Style Inventory - Primary**

Developed by Perrin, the LSI: P is based on the Dunn, Dunn and Price LSI. Its purpose is to identify how very young children learn. This instrument is still in the experimental stage, but it has been tested in over 400 school districts in an attempt to establish reliability and validity. In the initial studies in 1981 involving 34 kindergarten, first and second graders, 12 subscales of the LSI: P received reliability coefficients ranging
from .50 to .88. Favorable correlations between the LSI and LSI: P were also reported. Responses of a group of third grade students given both the LSI: P and LSI were correlated. The percent of agreement for most elements was 100% with several more between 56% and 89%, and only the structural elements were low at 44% (Perrin, 1983).

Summary

Learning style is best defined as "the manner in which many different elements from five basic stimuli affect a person's ability to absorb and retain" (Dunn, Cavanaugh and Quinn, 1980, p. 1). These basic stimuli include environmental, emotional, sociological, physical, and psychological components.

Cognitive style is considered a subgroup of learning style and is distinct from the latter in that it "describes the ways in which the brain processes information" (Dunn, 1981 b, p.34).

Learning style is becoming increasingly important in education from the standpoint of individualizing instruction. Numerous studies have shown that matching teaching method to learning style preference produces increased achievement. This has been shown to be especially true in reading performance.
Dunn, Dunn and Price developed a reliable and valid instrument, the Learning Style Inventory (LSI), a self-reporting assessment for grades three through twelve. Perrin designed the Learning Style Inventory - Primary Version. It is based upon the LSI and is to be used with primary students, kindergarten through second grade.
Chapter III

Design of the Study

Purpose

This study was proposed to analyze, describe, and compare the learning styles of a selected group of primary level students who were further distinguished as either receiving compensatory reading instruction or not receiving such instruction.

The principal purpose of this research was to determine if there were significant differences between learning styles of the reading compensatory and non-compensatory groups.

Design

Subjects

The subjects for this study were 60 first and second graders attending a suburban elementary school in western New York State. Twenty children (10 first and 10 second graders) were identified as reading compensatory students. They were either PSEN or Chapter I identified students. Forty children (20 first and 20 second graders) comprised the group of non-compensatory students. All subjects were selected by the random sampling method using a
table of random numbers.

**Instrument**

The instrument used was the Learning Style Inventory: Primary Version (LSI: P) developed by Perrin (1983). This instrument, the only one to date measuring learning styles of very young children, addresses the learning style elements in the Dunn and Dunn model of learning style diagnosis. The LSI: P, although experimental, has been tested in over 400 school districts. Educators in many states from New York to Washington and Alaska have administered this test in efforts to establish its validity and reliability. In a test-retest experiment in 1981 on 12 sub-scales of the LSI: P, reliability coefficients ranged from .50 to .88. When compared with the Dunn, Dunn and Price Learning Style Inventory, testing revealed favorable correlations (Perrin, 1983). Results of this study will be shared with the test author to provide additional data for validity and reliability studies.

**Procedure and Statistical Design**

The LSI: P was administered individually to each student and scored by the researcher. Children were presented with a pictorial chart (one of 12), each concerned with a distinct element of learning style, while the
examiner asked appropriate questions from a prepared script. Individual student profile forms were completed for each student. (An example of one of the charts with questions is included in Appendix A.)

The individual profiles were summarized in a frequency table and translated into percentages so that differences and similarities for each element could be more easily examined. A Chi-square Test of Independence was then calculated for each component of learning style.

Summary

The subjects of this study, reading compensatory and non-compensatory first and second graders, were tested with an experimental inventory, the LSI: P, for their learning style preferences. This unique instrument examines 12 elements of learning style as stipulated in the Dunn and Dunn diagnostic model. Comparisons were then made between the two groups of students using a Chi-square Test of Independence.
Chapter IV

Analysis of Data

Purpose

The differences in learning styles between reading compensatory and non-compensatory primary students were the variables being examined in this study. Included in this chapter is an analysis of data and the findings and interpretations of that data.

Findings and Interpretations of Data

Since the purpose of this research was to determine relationships and trends between two distinct groups of students in terms of their learning style, it was decided to employ the Chi-square Test of Independence for analysis of the data.

Each of the 12 elements of the LSI: P has three or more variables. For example, the learning style element of sound includes (1) a preference for sound, (2) a preference for quiet, and (3) the assumption that neither (1) or (2) are important to the individual. Therefore, the two groups examined, the reading compensatory group
and the non-compensatory group, were tested using the Chi-square statistic for each learning style element to determine if there were significant differences between the groupings in their preference for that particular learning style component.

The null hypothesis in each of the 12 cases was stated as follows: There is no significant difference between reading compensatory students and non-compensatory students on the element in question. The alternative hypothesis was stated as follows: There is a significant difference between reading compensatory students and non-compensatory students on the element in question.

The data from the 60 students involved in this study were originally compiled in a frequency distribution with the findings for each child individually reported. From this highly detailed table, the figures were further collapsed and summarized in a more concise form by dividing the individual findings into the two targeted groups, thus forming a percentage table. The frequencies in this table were used to compute the Chi-square Test of Independence.

The LSI: P consists of four general categories—environmental, emotional, sociological, and physical. The 12 learning style elements, which are included in this testing instrument, are divided among these four
groupings. Three of these sub-elements were shown to be statistically significant at the 0.05 level. Another element, at the 0.10 level, indicates a trend. However, despite the fact that not all elements were significantly different between the two groups, the figures in the contingency table provide some valuable information and so each learning style element will be examined in turn.

**Environmental Elements**

The four sub-elements of the environmental component are sound, light, temperature, and design.

**Table 1**

<table>
<thead>
<tr>
<th>Environmental Element of Sound</th>
<th>Not Acceptable</th>
<th>Acceptable</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>a (17) 85%</td>
<td>(1) 5%</td>
<td>(2) 10%</td>
</tr>
<tr>
<td>Non-compensatory</td>
<td>(29) 72.5%</td>
<td>(2) 5%</td>
<td>(9) 22.5%</td>
</tr>
</tbody>
</table>

\[ X^2 = 1.41 \]
\[ \text{Critical value} = 5.99 \ (0.05) \]

Fail to reject null hypothesis

\[^a\]All figures in () indicate frequencies.

Though the null hypothesis failed to be rejected for this element, it was apparent that first and second graders
in both groups strongly felt that sound was unacceptable while studying.

Table 2 also reveals no significant difference between groups on the learning style element of light. With only minor variations in numbers, these children acted as a unified group in their preference for bright light while doing their work. Forty percent of both groups preferred bright light with between 25-30% preferring dim light and between 30-35% finding this element unimportant in terms of school work.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Compensatory</th>
<th>Non-compensatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>(5) 25%</td>
<td>(12) 30%</td>
</tr>
<tr>
<td>Bright</td>
<td>(8) 40%</td>
<td>(16) 40%</td>
</tr>
<tr>
<td>Not Important</td>
<td>(7) 35%</td>
<td>(12) 30%</td>
</tr>
</tbody>
</table>

\[ x^2 = 0.22 \]
\[ df = 2 \]
Fail to reject null hypothesis

In the case of temperature, another environmental element, the null hypothesis was rejected. The data in Table 3 and the statistical description discloses the information that there is a relationship between groups and
the learning style element of temperature. It was expected that among compensatory students there would be a fairly equal distribution across the three variables of temperature (cool temperature preferred, warm temperature preferred, and temperature not important). Instead, it was found that 55% of this group actually had no preference for temperature. Considerably fewer than expected preferred warm temperatures.

Table 3
Environmental Element of Temperature

<table>
<thead>
<tr>
<th></th>
<th>Cool</th>
<th>Warm</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>(7) 35%</td>
<td>(2) 10%</td>
<td>(11) 55%</td>
</tr>
<tr>
<td>Non-compensatory</td>
<td>(16) 40%</td>
<td>(15) 37.5%</td>
<td>(9) 22.5%</td>
</tr>
</tbody>
</table>

\[ X^2 = 7.87 \]
\[ df = 2 \]
Critical value = 5.99 (0.05)
Reject null hypothesis

In the non-compensatory category, it was expected that answers would again be equally distributed. However, fewer than expected of these students had no preference for temperature, and more students than expected preferred warm temperatures. The main disparity between compensatory and non-compensatory students in terms of temperature is that for most poor readers neither feeling warm nor cool
was of any importance to them. Cool temperatures were preferred by 35% of this group. The other group seem to have more definite needs concerning their responses to temperature.

The environmental element of design was not statistically significant as shown in Table 4. There was little difference between the groups on this learning style element. However, it seems that the majority of this group of primary students felt more capable of producing their best work in a formal situation such as sitting at a desk while doing schoolwork or homework.

Table 4

<table>
<thead>
<tr>
<th>Environmental Element of Design</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Compensatory</td>
</tr>
<tr>
<td>(12) 60%</td>
</tr>
<tr>
<td>Formal</td>
</tr>
<tr>
<td>Informal</td>
</tr>
<tr>
<td>Non-compensatory</td>
</tr>
<tr>
<td>(28) 70%</td>
</tr>
<tr>
<td>(3) 15%</td>
</tr>
<tr>
<td>(7) 17.5%</td>
</tr>
<tr>
<td>(5) 25%</td>
</tr>
<tr>
<td>Not Important</td>
</tr>
<tr>
<td>(5) 12.5%</td>
</tr>
<tr>
<td>$\chi^2 = 1.50$</td>
</tr>
<tr>
<td>df = 2</td>
</tr>
<tr>
<td>Critical value = 5.99 (0.05)</td>
</tr>
<tr>
<td>Fail to reject null hypothesis</td>
</tr>
</tbody>
</table>

Summary of Environmental Elements

Research has been cited throughout this study confirming the validity of assessing students' preferences for environmental learning style elements, and then meeting these needs when possible in order to enhance
academic achievement. The environmental elements of sound, light, and design, though not indicative of differences between compensatory and non-compensatory readers do reveal a unity among these students in their preferences, and may indicate a general trend among primary students.

The learning style element of temperature, on the other hand, was found to have a significant difference between the two groups. Non-compensatory students appeared more aware of their temperature preferences while the compensatory group were predominantly unconcerned with this element. However, seven of the twenty poor readers preferred a cool environment.

Emotional Elements

The second category of learning style elements examined were the emotional elements of motivation, persistence and responsibility, and structure.

Table 5

<table>
<thead>
<tr>
<th>Emotional Element of Motivation</th>
<th>Teacher</th>
<th>Adult</th>
<th>Self</th>
<th>Unmotivated</th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp.</td>
<td>(8) 40%</td>
<td>(6) 30%</td>
<td>(4) 20%</td>
<td>(1) 5%</td>
<td>(1) 5%</td>
</tr>
<tr>
<td>Non-comp.</td>
<td>(9) 22.5%</td>
<td>(27) 67.5%</td>
<td>(4) 10%</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

\[ X^2 = 9.85 \quad \text{Critical value} = 9.49 \, (0.05) \quad \text{df} = 4 \]

Reject null hypothesis
Analysis of the data for the learning style element of motivation reveals significant differences between compensatory and non-compensatory students at the 0.05 level. The percentage of non-compensatory students stimulated by adults was twice as high (67.5%) as the percentage for compensatory students (30%), and these figures tallied with the expected frequencies for this variable. The data also indicate that, as a whole, more first and second graders are motivated by teachers and other adults, and also that more compensatory students than non-compensatory students report themselves as being self-motivated. This finding was higher than predicted. Also the statistics revealed nearly all children were motivated to some extent and differed only in the means or method of stimulation.

Table 6

<table>
<thead>
<tr>
<th></th>
<th>Is Not</th>
<th>Is</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>---</td>
<td>(15) 75%</td>
<td>(5) 25%</td>
</tr>
<tr>
<td>Non-compensatory</td>
<td>---</td>
<td>(22) 55%</td>
<td>(18) 45%</td>
</tr>
</tbody>
</table>

\[ x^2 = 2.26 \quad \text{Critical value} = 5.99 (0.05) \quad \text{df} = 2 \]

Fail to reject null hypothesis
Not a single child felt that he was irresponsible or lacked persistence. Seventy-five percent of the compensatory students and fifty-five percent of non-compensatory students saw themselves as being responsible and persistent. The remainder did not deem these qualities important in terms of their learning style.

The data for the emotional element of structure which encompasses the need for specific directions for tasks or the desire to be independent in completing one's assignments, were statistically significant at the 0.05 level. There was an important difference between compensatory and non-compensatory students for this variable.

Table 7

<table>
<thead>
<tr>
<th>Emotional Element of Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs</td>
</tr>
<tr>
<td>Little</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Compensatory</td>
</tr>
<tr>
<td>Non-compensatory</td>
</tr>
</tbody>
</table>

\[ x^2 = 6.17 \] Critical value = 5.99 (0.05)
df = 2
Reject null hypothesis

According to the expected frequencies, it was thought that compensatory readers would feel a need for structure. In actuality, only five percent of the group so indicated
compared with 32.5% of the good readers. An additional finding was that nine of the poor readers (45%) reported they needed little structure which was more than predicted (63 students).

In summary, the main difference was that more poor readers felt little need for structure while more good readers indicated a preference for a structured situation. There were similar high percentages of both groups that felt this element was not very important in whether they were able to achieve.

Summary of Emotional Elements

Emotional components of learning style are changeable and can vary over time and in different situations. For this sample of primary students, it was found that motivation and structure were statistically significant factors. There were definite differences between good and poor readers on these variables. Non-compensatory students were more often adult-motivated than compensatory students. Poor readers were actually divided between being teacher- and adult-motivated. Nearly 100% of both groups were motivated as opposed to being unmotivated.

In terms of structure, compensatory readers needed little structure while good readers required structure to a greater degree. Nearly half of both groups
disregarded structure as being important in their schoolwork.

Persistence and responsibility were factors most students had in common. None of the children reported that they were lacking in persistence and responsibility, although 45% of the non-compensatory readers felt this element was of little importance.

**Sociological Elements**

The sociological component of learning style was reported in Table 8.

<table>
<thead>
<tr>
<th></th>
<th>Alone</th>
<th>Adult</th>
<th>Peers</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>(10)  50%</td>
<td>(4)  20%</td>
<td>(2)  10%</td>
<td>(4)  20%</td>
</tr>
<tr>
<td>Non-comp.</td>
<td>(13) 32.5%</td>
<td>(9) 22.5%</td>
<td>(7) 17.5%</td>
<td>(11) 27.5%</td>
</tr>
</tbody>
</table>

$X^2 = 1.90$  
Critical value = 7.81 (0.05)  
df = 3  
Fail to reject null hypothesis

There were no significant differences for this element which describes with whom a child prefers to study. The frequency distributions do indicate that both groups of students concur that working alone is preferential to the other possibilities. It is noteworthy also that
50% of compensatory students deem that working by oneself results in a better grade of schoolwork. Twenty percent prefer to work with an adult and another twenty percent have no strong feelings about this element at all. Only two children (10%) felt comfortable working with their peers. The distribution for non-compensatory students was not quite as variant but followed a similar pattern.

**Physical Elements**

Perception, intake, time of day, and mobility are the elements that comprise the physical component of learning style.

Perceptual differences were found at the 0.10 level signifying a trend, not as powerful an indicator as findings at the 0.05 level would be. Expected frequencies were not calculated for this element due to the fact that several cells exhibited miniscule data which would only serve to inflate the value of the Chi-square.

The data in Table 9 show that the differences between the two groups lie in the fact that more compensatory students reported visual (55%) and kinesthetic (25%) perceptual preferences than the second group.
Table 9
Physical Element of Perception

<table>
<thead>
<tr>
<th></th>
<th>Tactual</th>
<th>Auditory</th>
<th>Visual</th>
<th>Kines-</th>
<th>A</th>
<th>V</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>---</td>
<td>---</td>
<td>(11) 55%</td>
<td>(5) 25%</td>
<td>(1) 5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-compensatory</td>
<td>(1) 2.5%</td>
<td>(5) 12.5%</td>
<td>(20) 50%</td>
<td>(1) 2.5%</td>
<td>---</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>V</th>
<th>T</th>
<th>A</th>
<th>T</th>
<th>A</th>
<th>V</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>(1) 5%</td>
<td>(1) 5%</td>
<td>---</td>
<td>(1) 5%</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Non-compensatory</td>
<td>(2) 5%</td>
<td>(4) 10%</td>
<td>(2) 5%</td>
<td>---</td>
<td>(2) 5%</td>
<td>(1) 2.5%</td>
<td>(2) 5%</td>
<td></td>
</tr>
</tbody>
</table>

$X^2 = 17.71$  Critical value = 19.7 (0.05), 17.3 (0.10)
df = 11
Reject null hypothesis at 0.10 level

Key  
$T = $ tactual  
$V = $ visual  
$A = $ auditory  
$K = $ kinesthetic
Non-compensatory readers also preferred learning by visual means (50%) and in addition 12.5% saw themselves as auditory learners.

A closer examination of the data shows that there are eight categories where children indicated equal preference for a combination of modalities. Five of these categories displayed a partial preference for visual learning (AVT, AV, VK, AVK, TV), and five cells also combined auditory channels with other modalities (AVT, AV, TA, AK, AVK). Kinesthetic learning, in addition to accounting for 27.5% of all the subjects' preferences, also was found to be important in four of the combined categories. Tactile preferences were disregarded by compensatory students and only one of the non-compensatory group selected this form of perceptual learning. However, tactile preferences did appear in four of the combined cells.

In summary, the data for perceptual preferences of compensatory readers show a decided inclination for visual learning (combined total of all categories of 70%: visual 55%, AVT 5%, AV 5%, VK 5%) with a secondary strength deriving from the kinesthetic modality (kinesthetic 25%, VK 5%, AK 5%). None of the poor readers favored tactual or auditory learning alone, though three
children accepted auditory learning when combined with other modalities.

The non-compensatory group also preferred the visual modality (50%) with another 22.5% combining visual learning with other modalities as their favored learning method. More of this group preferred auditory modalities (12.5%). Not as many (2.5%) considered themselves kinesthetic learners as compared with 25% of the poor readers.

The majority of these first and second graders preferred to learn visually, either exclusively or in some combination of modalities.

<table>
<thead>
<tr>
<th>Physical Element of Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Not Need</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Compensatory</td>
</tr>
<tr>
<td>Non-compensatory</td>
</tr>
</tbody>
</table>

$X^2 = 0.26$  
Critical value = 5.99 (0.05)  
df = 2  
Fail to reject null hypothesis

There is no significant difference between compensatory and non-compensatory students on the learning style element of intake, that is, whether one desires
to nibble or snack while studying or prefers to abstain.

Table 11

<table>
<thead>
<tr>
<th>Physical Element of Time</th>
<th>A.M.</th>
<th>Afternoon</th>
<th>P.M.</th>
<th>Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>(2) 10%</td>
<td>---</td>
<td>---</td>
<td>(18) 90%</td>
</tr>
<tr>
<td>Non-comp.</td>
<td>(5) 12.5%</td>
<td>(8) 20%</td>
<td>(1) 2.5%</td>
<td>(26) 65%</td>
</tr>
</tbody>
</table>

\[ x^2 = 5.71 \]
\[ df = 3 \]
Critical value = 7.81 (0.05)
Fail to reject null hypothesis

The findings for this variable are interesting since 90% of compensatory and 65% of non-compensatory students had no preference for the time of day that is best for them in terms of alertness and productivity in their studies. None of the compensatory students selected afternoon or evening as positive choices, and only 10% determined that morning was the best time for them to work. Non-compensatory students when compared with compensatory students felt the afternoon was the time of day in which they did their best work.

Mobility was the last physical element of learning style to be examined in this study. The majority of students in both groups reported similar responses in that mobility (the need to move about) was not necessary during study time.
Table 12

<table>
<thead>
<tr>
<th>Physical Element of Mobility</th>
<th>Not Need</th>
<th>Needs</th>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory</td>
<td>(16) 80%</td>
<td>(3) 15%</td>
<td>(1) 5%</td>
</tr>
<tr>
<td>Non-compensatory</td>
<td>(35) 87.5%</td>
<td>(2) 5%</td>
<td>(3) 7.5%</td>
</tr>
</tbody>
</table>

\[
X^2 = 1.81 \quad \text{Critical value} \quad 5.99 \ (0.05)
\]
\[
df = 2
\]

Fail to reject null hypothesis
Summary of Physical Elements

Perceptual differences at the 0.10 level were found between groups. Poor readers preferred learning through visual channels and secondarily, through the kinesthetic mode. Non-compensatory students also favored visual learning but did not prefer the kinesthetic mode. Both groups were primarily visual learners.

In terms of the need for intake while learning, there were no statistical differences between the groups. They shared the common view, by far, that snacking during study time was not necessary.

Time of day preference yielded no significant differences between groups. Most of the children indicated no decided preference and the assumption is that this was not an important element for this particular sample.

Most children felt that moving about during study/work times was not conducive to productivity. Again no significant differences were found for this element as good and poor readers were in agreement.

Summary of Chapter IV

Three variables, temperature, structure, and motivation, were statistically significant at the 0.05 level. An environmental element, temperature, was found to be
unimportant to the majority of compensatory readers while non-compensatory readers had more definite preferences. Two of the emotional elements, structure and motivation, were significant for this sample. Structured situations were preferred by 32.5% of the good readers while 45% of the compensatory readers reported no need for structure. It was expected that compensatory readers would require structure but this was not the case according to their self-reports. Only one child indicated such a need.

Significantly, more good readers were motivated by adults compared with compensatory readers. Twenty percent of the compensatory group also indicated they were self-motivated, a figure higher than expected. Most of the students in the sample declared themselves as being motivated.

The learning style element of perception, at the 0.10 level, indicated a trend. Most compensatory readers preferred visual and kinesthetic modalities, while good readers were also visual learners to a lesser extent and did not prefer the kinesthetic mode. Good readers also were found in nearly all of the modality areas presented while poor readers centered in the visual and kinesthetic areas.
Those elements that were not statistically significant suggested to this researcher that primary children, as a whole, have some common preferences which cut across their dissimilar progress in reading. The majority of these students were unified in their preference for quiet, bright light and a formal design. Emotionally, they saw themselves as being persistent and responsible. Working alone was their sociological preference and they felt no need for intake or mobility while working. Both groups, for the most part, had no preference for any particular time of day to work or study.

The following table provides a brief summary of the learning style elements that were examined.
Table 13

Environmental Elements

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<td>Sound</td>
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Emotional Elements

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Sociological Element

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Physical Elements

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<td>Intake</td>
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<td>x² = 0.26</td>
<td>x² = 5.71</td>
<td>x² = 1.81</td>
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**Significant at the 0.05 level

*Indicates a trend at the 0.10 level
Chapter V

Conclusions and Implications

Purpose

The research undertaken in this study was proposed to determine the differences, if any, between the learning styles of good and poor readers in the primary grades.

Conclusions

Since the purpose of this project was to ascertain differences in learning styles between compensatory and non-compensatory primary students through the administration of an experimental instrument, it is sufficient to conclude that there are differences for certain elements: temperature, structure, motivation, and perception. There are also similarities between the two groups in how they value other learning style components. Most of this sample had congruent preferences for sound, light and design. The majority preferred to work alone and felt they were responsible and persistent. More children rejected intake and the need to move about while studying or learning. There were no definite preferences in either group for the time of day they
were most alert and ready to work.

Environmental Elements

**Sound.** In terms of the environmental elements, sound was found to be unacceptable by the majority of students in both groups. Crino (1984) found the same results in her testing and observation of kindergarten students when she reported 36 of 50 children preferred quiet. The importance of sound (or the lack of it) is reflected in Pizzo's (1981) work with sixth graders. She found that students who were taught in an environment that matched their preference for sound achieved increased reading comprehension scores (p > .01) and performed poorly when taught in a mismatched situation.

**Light.** When the children reported their preference for light, again the responses were more alike than different. In Crino's (1984) study of kindergarteners, children were also divided evenly in the three variables for light. A study by Dunn and Dunn (cited in Dunn, 1983 b) revealed that poor readers seemed to prefer low light and also that right-brained youngsters shared that preference. In another study concerning the effects of a matched and mismatched lighting environment, Krimsky (1982) found that fourth graders achieved increased reading speed and accuracy when
tested in a complementary lighting. In terms of this analysis, lighting preferences are mixed, though the greater number prefer bright light. As shown in other studies, when environmental preferences are adhered to as closely as possible, the result is greater academic achievement.

Temperature. Temperature was the only environmental element that was statistically significant. The main difference between the groups was the apparent unimportance of temperature to poor readers, while more good readers had definite preferences for either cool or warm temperatures. The literature revealed little or no research on this particular element.

Design. Though no significant differences were found between good and poor readers on the environmental element of design, the data did reveal that most children preferred a formal setting when doing their work. The majority of kindergarteners in Crino's (1984) study preferred a formal design, which corroborated the results found in Shea's (1983) research with ninth graders. Shea's study also revealed improved reading scores when the students' preferences for design were taken into account.
Emotional Elements

Motivation. The emotional component of learning style yielded some significant data. More first and second graders are motivated than not. The differences lie in the source of stimulation. Apparently, compensatory readers were more likely to be motivated by teachers than non-compensatory readers (40% vs. 22.5%), and also compensatory readers were less likely to be motivated by other adults than non-compensatory readers (30% vs. 67.5%). Poor readers also reported themselves to be more self-motivated than good readers (20% vs. 10%). Some of these findings were not expected and further investigation is needed in this area before conclusions can be made concerning the effect of motivation on reading habits, at least in terms of assessment with this instrument.

Responsibility and Persistence. The majority of these children felt themselves to be responsible and persistent, concurring with Crino's (1984) longitudinal kindergarten study which exhibited very similar results with 48 of 50 children positively relating to these elements.

Dunn (1982) reports that persistence and responsibility are the only learning style elements that appear to be related to IQ—"the higher the IQ, the
higher the child's level of persistence and responsibility" (p. 80). While there is a variation in the average IQ of compensatory students (99.6) and non-compensatory students (109.6), they do not differ in their perceptions of themselves as being responsible and persistent in school work. (See Appendix B for a listing of IQs for the two groups). This may be an element of learning style that evades definition at the primary level with any type of assessment instrument devised to date.

Structure. The findings for this emotional element were significant, in that more poor readers saw no need for structure while good readers preferred structured situations. Also it is noteworthy that 50% of the compensatory readers and 42.5% of the non-compensatory readers felt that a structured school environment was not necessary or important. This information could indicate that more structured environments produced better readers or higher achievement.

Sociological Element

The findings for this variable, though not significant, suggested a pattern. These children seemed to prefer working alone, while most children rejected working with their peers. It would appear that primary
students have found certain sociological associations more appropriate for success and that doing their school work in a solitary situation is preferred.

Physical Elements

Perception. Since the data for this element indicates a trend in support of a preference for the visual modality in learning for young children, then this study is in agreement with the work of other researchers (Button, cited in Semple, 1982; Crino, 1984; Dunn and Carbo, 1979; Eiszler, 1982; Fiske, 1981; Price, 1980; Urbschat, 1977).

Intake. Primary students are in agreement, for the most part, on this physical element of learning style. Eating while studying is discouraged or felt to be unimportant. More of the first and second graders in this study as well as other research (Crino, 1984) agree that it is better not to eat or snack while engaged in scholarly pursuits.

Time. This element was not important to many of the students in this study. However, in the analysis of kindergarten students' preferences (Crino, 1984), it was found that more of these children preferred the afternoon to any other time of day. There were also
more kindergarteners who found early evening their optimal learning time. It may be that teacher observation would be a valuable additive in assessing this element, since young children may not be aware of the time of day which is best for them to study or work. Virotsko (1983) confirms the importance of matching this learning style element to the child's preference in her work with elementary students.

**Mobility.** Since most children in this study thought they could do their best work if they remained in their seats, it may be correct to assume that this is a study habit that children of all achievement levels support. This researcher's observations of the students who replied to this question was that they were quite definite about their preferences in this regard. Children in Crino's (1984) research were also overwhelmingly positive that they did not require mobility during instructional time. Teachers disagreed with the mobility needs of these kindergarten children, however. Teachers who observed these students felt they were more active than their answers would indicate. This discord between teacher observations and students' self-reports seems to reinforce a principle that learning style research has supported: It is wise to observe children at length when attempting to ascertain learning style in
addition to looking at the child's reported preferences.

Summary

The results of this study correlated closely with Crino's (1984) longitudinal study of kindergarteners. The purpose of her work was to design and improve curriculum utilizing learning style-based instruction. Changes were made in curriculum planning as a result of the examination of children's learning styles and teacher observations. Her students were tested with the LSI: P. Since the learning style preferences are similar for this group of first and second graders to those of the kindergarteners in Crino's (1984) research, it is possible that the beginning of some generalizations as to the pattern of preferred learning of very young children can be made.

Descriptive research seeks to define or characterize variables and the relationships between them. In this case, the results obtained give a representation of a select population of primary students in terms of their similar and diverse learning styles. It is difficult to establish whether the significant differences in reading performance (compensatory and non-compensatory) can be wholly or partly attributed to the unique learning styles of the children and the method of instruction.
they have experienced. However, the review of literature on learning styles does indicate that identification of one's preferences for learning in certain ways and the subsequent matching of teaching style and/or instruction to those preferences result in higher academic achievement across all grade levels.

This study adds to the general body of knowledge that is being accumulated regarding the learning styles of young children. It is especially valuable to educators who are planning curriculum materials and methods for the beginning stages of reading instruction.

**Implications for Research**

This study raises other questions worthy of pursuit in the area of learning styles.

Replications of this study are necessary in order to more definitively identify general trends in learning style among younger children, especially as these learning style elements relate to reading instruction. Further testing with the LSI: P would assist its developer in refining this instrument and serve to verify its validity and reliability.

Information obtained from assessing learning styles of primary level students should assist teachers in planning the most effective instructional methods for
meeting the individual needs of each child. Compari-
sons could be made in a pre- and posttest design to
determine any differences in achievement as a result
of adapting teaching to learning style. In terms of
a more select segment of the school population, the
examination of learning styles of compensatory readers,
adjustments of instruction and comparisons of test
results would be especially beneficial to these children.

Implications for Classroom Practice

The findings of this study have particular relevance
for teachers of primary students as well as for those
responsible for curriculum planning.

For example, the majority of children tested pre-
ferred learning visually. If that is the optimal mode
for first and second graders to learn, then instructional
materials and methods of instruction should be developed
and implemented that will take advantage of this know-
ledge of pupils' perceptual preferences. Assessment of
individual learning styles, especially the perceptual
elements, is extremely important in remediating poor
reading achievement.

It is also important to consider that observation
of children's learning styles, in addition to instru-
mental learning style diagnosis, is the ideal plan for
determining preferences. Teacher attitude (positive or negative) toward a student as well as the attitude "toward the concept of diagnosis/prescription itself can drastically influence both instrument interpretation and consequent prescription" (Gregorc, cited in Holland, 1982, p. 16). Teachers need to be trained in how to recognize learning style cues. For instance, students who constantly chew on their erasers or pencils, suck their thumbs, or chew their fingernails, may be unconsciously exhibiting a need for intake. Instructors should also be aware that learning styles are transient and may change over time or in certain situations.

Teachers who have analyzed the learning styles of their students through observation and instrumentation, need to acquaint themselves with the techniques available to meet the needs of these children. In terms of the sociological element, groupings can be arranged that will include children working in pairs, and small groups, alone or with an adult. Environmentally, a section of the classroom could be designated as a quiet area. For those children who are not motivated, assignments should be of high interest and kept short. Tactile-kinesthetic learners could "be taught initially with holistic reading approaches (such as language-experience)
Summary

The goal of this study was to determine differences and similarities in learning style between good and poor readers at the primary level using a self-reporting assessment instrument. Differences between groups were found with the elements of temperature, structure, motivation, and a trend was indicated with the learning style element of perception. The primary students in this sample had similar preferences in terms of the remaining elements.

Research is needed to further define learning style elements important to very young children, as well as serving to validate the LSI: P as a reliable and valid assessment instrument of learning style for primary level students. In addition, further study is required in the area of curriculum planning, teaching methods and materials, and instructional techniques that will implement learning style-based instruction.

Utilization of the information gained from a learning style assessment of students is recommended for teachers in order to individualize instruction and to provide a framework for educating children.

It can be concluded from this study that the learning
style preferences of the better readers are being met, even without any formal assessment. However, in the case of poor readers, there is an academic deficit. It is sensible, therefore, to begin remediation with a learning style assessment in order to ascertain if there are needs that are not being met. Indeed, including learning style data in the IEP's of handicapped youngsters is recommended by the learning style research (Carbo, 1983).

True individualization of instruction can be developed using the child's learning style preferences as a starting point, and developing a total learning package that takes into consideration the ways a child learns best emotionally, environmentally, sociologically, physically, and psychologically.

Teaching children according to their learning style involves the complete commitment of educators. For the students who are not achieving success, research has shown that learning style-based instruction can make a significant difference academically. Thus, it can be concluded that teacher commitment to the concept of learning style should be fostered and encouraged.
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References


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Appendix A
Appendix A

**ELEMENT: Mobility**

Display the picture. (point to picture 1). This little girl likes to sit at her table or desk until all of her work is finished.

(point to picture 2). This little girl likes to get up and move around while she is doing her work. She likes to work at her desk and then get up and do some work at the table.

I am going to ask you a few questions about how you like to do your school work.

**Questions:**

1. When you sit in one place for a long time is it:
   - 1 easy for you to do your schoolwork?
   - 2 hard for you to do your schoolwork?

2. If you could get up and move around the room when you wanted, would it be:
   - 1 hard for you to do your schoolwork?
   - 2 easy for you to do your schoolwork?

3. When you are doing your homework do you like to:
   - 1 sit in one place until you have finished?
   - 2 get up and move around while you are doing it?

4. If you could choose any way you wanted to do your schoolwork would you like to:
   - 1 sit in one place and do it?
   - 2 get up and move around while you are doing it?

5. Let's look at the picture again. Remember, (point to picture 1) This little girl likes to sit at her desk until all her work is finished. (point to picture 2) This little girl likes to get up and move around while she is doing her schoolwork. Which picture shows how you like to do your schoolwork? (have the child point to a picture or verbally respond.)
## Appendix B

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Mean IQ  109.6

Mean IQ  99.6