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**Does Learning Style Instruction Have a Positive Effect  
on Academic Achievement in the First Grade?**

by  
**Nancy D. Rosenberg  
Pamela M. Hernandez**

**A Thesis**

**Submitted in Partial Fulfillment of the Requirements of the  
Master of Arts Degree in the Graduate Division  
of Rowan College of New Jersey**

**May 1995**

Approved by

Adviser

Date Approved

May 8, 1995

## **Abstract**

RosenBerg, Nancy D.  
Hernandez, Pamela M.

Does Learning Style Instruction  
Have a Positive Effect on  
Academic Achievement in the  
First Grade? 1995.

Thesis Adviser: Dr. Stanley Urban,  
Seminar in Learning Disabilities.

The purpose of this study was to determine the effectiveness of learning style instruction when implemented in a typical first grade classroom setting. The study was designed to determine if the use of several learning style methodologies would produce an increase in academic achievement.

Two regular first grade classes were used as the Study and Control Groups. Each student in the Study Group, was surveyed to discover possible learning styles present within the group. For approximately six months, the Study Group received instruction which was modified, wherever possible, to allow for each student's individual needs. During this period, the Control Group received typical instruction with no allowances being made for individual learning styles.

At the conclusion, both the Study and Control Groups were assessed to determine their current academic levels. The mean scores from each group were compared to determine if a significant difference existed between them.

Through the use of comparative scores, the Study Group's results revealed a significant increase on only one subtest. Therefore, the

implementation of learning styles instruction in a regular education first grade classroom did not demonstrate a significant increase in academic achievement when compared to a similar first grade class receiving typical instruction.

## Mini-Abstract

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## **Chapter One**

### **Introduction**

The National Task Force on Learning Style and Brain Behavior adopted the following definition of learning style with the understanding that it would be revised if necessary: "Learning style is that consistent pattern of behavior and performance by which an individual approaches educational experiences. It is the composite of characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment. It is formed in the deep structure of neural organization and personality that molds and is molded by human development and the cultural experiences of home, school, and society." (Bennett, 1990) In depth research reveals many different descriptions of learning style, but the common thread woven through all definitions is that students assimilate new information in a variety of ways.

Still, critics cite confusion among the many and varied definitions of learning styles. There is controversy surrounding the topic of learning styles. Some controversial issues include the arguable weaknesses in reliability and validity of learning styles measurement tools, the relevance of characteristics of the learners, modifications in the instructional setting, and the feasibility of

implementing learning style instruction in a primary classroom.

Despite the controversy, research shows that every person has a learning style. Some learning styles are biological and some are developed through experiences. More than twenty years of work on learning styles theory has confirmed that the way teachers present information can determine whether learning occurs.

Learning styles instruction evokes a wide range of emotions among educators. These emotions range from dismissive skepticism, to "throw the baby out with the bath water" conversion, and reach as far as full-blown fanaticism. However good the intentions of learning styles instructors and theorists may be, the results should be demonstrated through significantly higher academic achievement in order to make the attempt worthy of the effort.

### **Purpose**

The purpose of this study is to determine the extent to which academic achievement is effected by educational instruction which has been designed to acknowledge and foster the learning styles of each student.

### **Hypothesis**

Upon completion of implementing learning styles instruction in a regular education first grade class and comparing academic achievement with a control population, students in the "learning styles" classroom will

demonstrate an increase on an individually and group administered assessment device.

### **Limitations**

The following limitations apply to the generalizability of this study:

1. This study involves a small sample size.
2. This study examines only a regular education first grade student population.
3. The effect of the teacher's facilitating style on the students' collective performance is indeterminate.
4. The effect of scheduling restraints were beyond the control of the teacher in charge of the Study Group.
5. The assumption that both the Study and Control Groups contain comparatively equal ranges of academic abilities is prerequisite.

### **Overview**

In Chapter 2, pertinent information will be considered regarding individual learning styles as well as learning styles instruction.

In Chapter 3, a design of the study will be furnished. Included will be parameters of the experiment as well as technical information concerning each assessment device to be used.

In Chapter 4, data obtained as a result of the experiment will be presented and analyzed.

In Chapter 5, a summary and conclusions will be presented.

## Chapter Two

### Overview

Learning styles is a very broad area: broad in its information and conceptual framework and broad in its application. (Brandt, 1990)

Despite decades of research, learning styles continues to be an emerging concept about which the questions seem to outnumber the answers. Due to the wide scope of this topic, we have chosen to focus on specific areas which fall under the umbrella of learning style theory. We will attempt to organize this review of the literature by highlighting key issues which have evolved during the long history of learning styles research. Historical perspectives will lead the way to understanding the major researchers/proponents and identifying their individual points of view on the concept of learning styles. Through our study of the most notable contributions, we hope to impress upon the reader the different theories and practices which have been developed by the leaders in this field. The role which culture plays on this topic will be addressed. We will also identify information regarding the many measurement tools currently in use as a means of identifying the specific learning styles of individuals. Our review will culminate with a summary of our major findings.

## Learning Styles Research

Psychologists have been researching the nature of learning styles for a number of decades. (Bennett,1990) The Field-Independence/ Dependence approach to Learning Styles has been the most widely researched with over 2,000 studies completed to date. This research began in 1954 by Herman Witkin and his associates. One of Mr. Witkin's experiments placed individual subjects seated on a chair in a tilted room. The subjects were asked to adjust their chair and their body into a true, upright position. The second experiment seated subjects in a darkened room containing a luminous rod inside of a slanted, luminous picture frame. The subjects were asked to set the rod to the true vertical position. The participants who aligned themselves with the tilt of the room were labeled field-dependent or currently known as field-sensitive. They also tended to be influenced by the slant of the picture frame and were unable to place the rod in its true, upright position. Those who were found to be field-independent ignored their surroundings and the frame as they adjusted their bodies and the rod into the true upright position.

Knowledge of field-dependence/independence, as it relates to learning styles, has not been available to teachers and counselors until recently. Through the use of a simple embedded figures test, diagnosis has been simplified.

The information gained from this assessment device can be utilized by educators for application in the classroom. Some psychologists suggest that knowledge gained through this approach to determining learning styles can bring about an awareness in those who are field-independent so that they

might learn to be more sensitive to other people. On the other hand, individuals labeled field-dependent may benefit through an increase in their analytic skills.

The need for structure is sometimes regarded as a manifestation of learning style. (Bennett, 1990) The way in which students handle themselves in the classroom can be an indicator of their need for structure or the depth of their independence. These indicators may include factors such as the ability to make choices, their need for reassurance from the teacher, and their demonstration of self-reliance.

David Hunt of the Ontario Institute for Studies in Education researched the relationship between structure and learning styles in the 1960s. Hunt's view of learning style centers around the amount of external structure needed by a student. He identifies the characteristics of students who require varying degrees of structure from a great deal to very little and teaching approaches that are most appropriate for the degree of structure required. (Bennett, 1990) Through the paragraph completion method, Hunt assesses students' conceptual levels. The responses to this method indicate the amount of structure the students need at the time.

The implications of Hunt's findings show that conceptual level, in terms of learning style, is a developmental phenomenon which ranges from the "unsocialized" to the "independent". Knowledge of learning style can influence and enhance the development of the conceptual level. (Davis, Chiasson, and Schwimmer, 1981).

Later research by Ramirez, Casteneda, Halverson and Gray suggests that learning style is related to world view, that certain learning styles tend to

be predominant in specific cultures. These researchers studied cultural groups in relation to their learning styles. They found that field-dependent (currently identified as field-sensitive) and field-independent learners are affected by cognitive style and cultural differences which create individual learning styles that are not permanently fixed. This theory holds that the Mexican-American youngster and inner-city African-American youth tend to grow up in cultures that produce primarily field-sensitive learning styles. (NAASP Bulletin, 1983) Research by R.L. Jacobs, Sr. supports this theory. His study of African-American high, average and low achieving seventh graders found that African-Americans exhibited a more field-sensitive style than did White-Americans, who tended toward the field-independent style. Furthermore, the research of Ramirez et al suggests that bilingual individuals tend to be bicognitive; that is, fluent speakers of Spanish and English tend to have greater cognitive flexibility than monolinguals, being able to move back and forth between global and analytical orientations as needed. (Bennett, 1990)

Currently, the approach most widely used is the multidimensional approach to learning styles. This method, espoused by Rita and Kenneth Dunn, surrounds the concept of identifying key elements and, as much as possible, matching instruction and materials to those individual differences. The Duns, who direct the Center for the Study of Teaching and Learning Styles, define learning style as "the manner in which at least eighteen different elements from four basic stimuli affect a person's ability to absorb and retain." These stimuli are: Environmental (sound, light, temperature and design), Emotional (motivation, persistence, responsibility and structure),



Sociological (peers, self, pair, team, adult or varied), and Physical (perceptual, intake, time or mobility). Many critics question the origin of the elements highlighted in the Dunn model. One of the outstanding issues raised by critics questions the model's correlation to intelligence. That is why it should be noted that the Dunns have recently expanded their approach to include cognitive processes (analytic/global, cerebral preference, and reflective/impulsive).

Prior to implementing learning styles based instruction, the Dunns state that all students should be assessed using one of the versions of their Learning Styles Inventory, of which two currently exist: one for the primary grades and a second instrument for grade four to adult. This self-report questionnaire, consisting of 104 items, yields a computerized profile and narrative which describes the learner's preferences related to classroom environmental conditions and their own emotional, sociological, and physical needs. (Bennett, 1990) The Dunns clearly state that the instrument is a diagnostic one, permitting educators to match instructional environments and activities to individual characteristics. (Kramer, Conoley, and Murphy, 1992) The Dunns insist that traits develop over time and that students should always be taught through their strengths. (Dunn, DeBello, Brennan, Kiminsky and Murrain, 1981) Towards that end, they feel that the use of their Learning Styles Inventory is a critical element in learning styles based instruction. When asked why learning styles have to be identified with an instrument, Rita Dunn replied, "Teachers can not correctly identify all the characteristics of learning style. Some aspects of style are not observable even to an experienced educator. In addition, teachers often misinterpret behaviors or

misunderstand symptoms." (Dunn, 1990)

Another major force in the advancement of learning style research comes from a psychological viewpoint. Anthony Gregorc, an educator and consultant in Columbia, Connecticut, defines learning style as the manner in which the learner mentally orders the concrete and abstract perceptions of his or her environment. Gregorc asserts that learners relate with and interpret their environment with either sequential or random ordering patterns. (Wakefield, 1993) These patterns, or "mind styles", combine to create four distinct learning styles: Concrete Sequential (practical, step-by-step, methodical, deliberate, stable, persistent, realistic, organized), Abstract Random (feeling, multi-faceted, perceptive, imaginative, colorful, empathetic, spontaneous, people-person), Abstract Sequential (intellectual, logical, analytical, rational, verbal, referential, judgmental, synthesizer), and Concrete Random (intuitive, independent, original, futuristic, risk-taker, creative, experimental, curious). However, since we all interpret both concrete and abstract perceptions, and, since the nature of that undertaking often requires that we use either a sequential or random approach, most people automatically opt for whichever style of thinking is required by the situation. (Wakefield, 1993) These combinations of dualities consist of distinctive, observable behaviors that provide clues to the functioning of people's minds and how they relate to the world. (Davis et al, 1981)

Personal awareness is an aspect of all learning style theories, but Gregorc emphasizes it more than other advocates. In a conversation with Rita Dunn and Bernice McCarthy on the similarities and differences of learning styles, Gregorc states that if you want to know someone else, know

yourself first. A teacher needs to realize her or his limitations. He theorizes that the teacher's "style" is as important as the learner's "style". This theory is supported by research from Witkin, Moon, and McDonald. Documented results from these studies reveal that students perform better in classes taught by teachers having learning styles which are similar to their students. Concurrently, Gregorc lauds the practice of team teaching as an excellent means of accommodating the inherent differences between educators' styles and students' needs. Strong emphasis is placed on the matching of instructional materials and methods to meet the range of individual preferences. Gregorc also recommends that selected nonpreferences be utilized at times to encourage students to strengthen those areas. (Davis et al, 1981)

In contrast to the Dums' stringent use of their Learning Styles Inventory, Gregorc adamantly discourages the idea of a diagnostic and prescriptive method of implementing learning styles instruction. Rather, Gregorc feels that through the use of a style delineator, such as his Transaction Ability Inventory (TAI), educators may become sensitive to the demands, however unconscious, which they place upon students to adapt to their style and their decisions within the classroom. The TAI is a self-report instrument based on a rank ordering of four words in each of ten sets which reveal the four combinations of learning preference dualities. (Bennett, 1991) Since some students will and can adapt to their teacher's style and some students will not and can not adapt for a variety of reasons, Gregorc strongly questions the haphazard, naive, and selfish manner in which some educators select instructional means, methods, and environmental conditions for their

students. He further postulates that findings in learning style research should change our vision of some students who are labeled "learning disabled". Gregorc questions whether all individuals so classified are truly disabled in a neurological sense, or are "disabilities", in some cases, symptomatic of their inability to align and adapt to style expectations or the demands of the environment. He also wonders if learning disabled children can be created through ignorance of how the brain functions and how people learn. (Gregorc, 1982) When teachers consistently provide learning situations and strategies that match these four styles of learning, Gregorc found that students thrive academically, develop positive self-images, and learn to respect other's differences. (Butler, 1988)

How learning styles instruction can be implemented in the classroom has been the aim of Bernice McCarthy's studies. She focuses on learning styles theory from the teacher's point of view rather than from the researcher's perspective. Her main goal was to find an instructional design that each teacher could use to improve the odds for children without having to individualize. In her quest to develop this usable, teacher-friendly model, McCarthy found that one's learning style selects what he or she pays attention to and one's brain-processing represents what she or he pays attention to.

McCarthy, a consultant in Barrington, Illinois, has taken the work of David Kolb, a professor of organizational behavior at Case Western Reserve, and built a bi-polar systematic learning cycle in which each of four types of learners is accommodated in turn during a lesson or unit. She has overlaid the hemisphericity of the brain to bring that dimension to her work. (Guild, 1994) Inherent in the system, which McCarthy recreated, are two major

premises: (1) People have notable learning styles and hemispheric (right-mode/left-mode) processing preferences; and (2) Designing and using multiple instructional strategies in a systematic framework to teach to these preferences can improve teaching and learning. (McCarthy, 1990) When the two dimensions of perceiving and processing are juxtaposed, a four-quadrant model is formed. Thus the 4-MAT System which has become the hallmark of Bernice McCarthy's approach.

According to McCarthy's model, there are four major learning styles: Imaginative learners, Analytic learners, Common Sense learners, and Dynamic learners. Imaginative learners perceive information concretely and process it reflectively. They integrate experience with the self. Analytic learners perceive information abstractly and process it reflectively. They devise theories by integrating their observations into what they know. Common Sense learners perceive information abstractly and process it actively. They integrate theory and practice, learning by testing theories and applying common sense. They can also be called pragmatists since they believe something works and then use it. Dynamic learners perceive information concretely and process it actively. They integrate experience and application, learning by trial and error. (McCarthy, 1990) Each of the four learning styles contains right-mode, left-mode, and whole-brained learners because, in reality, we approach learning with our whole minds, our intuition, our beliefs, and our subjectivity intact. Similar to Gregorc's theory, McCarthy's model firmly believes that we need to honor both modes of processing in our schools by engaging the whole brain.

If all four learning styles are taught to all learners in a cycle that

alternates from right-mode to left-mode information processing, and, if, in doing this, all styles are equally valued, this integration will allow learners to be comfortable some of the time and stretched and challenged at other times. And, because it is clear that all learners need all segments of the cycle, the entire cycle then becomes more valuable than any one segment. (McCarthy, 1990) McCarthy strongly believes that differences in learning styles should be celebrated.

Howard Gardner, creator of one of the more recent theories in the learning styles venue, feels that traditional modes of education and assessment do not promote genuine knowledge, understanding and achievement. Since 1983, when his book, *Frames of Mind*, first described the theory of Multiple Intelligences, Gardner has challenged not only the ways in which we see ourselves and our children, but also the ways in which we teach and learn. (Steinberger, 1994) In his 1991 book, *The Unschooled Mind*, Gardner argues that even the best students from the best schools develop through the traditional system of education flawed theories about the way the world works and why people do what they do. His theories have developed as an extension of his work as a professor at Harvard University, as an author of a dozen books, through his work with victims of brain damage at the Veterans Administration Medical Center in Boston and highly artistic children at Harvard, and, most recently, through a collaborative project called ATLAS (Authentic Teaching, Learning, and Assessment for all Students).

Gardner's theory of Multiple Intelligences (MI) challenges the commonly held belief that "intelligence" can be objectively measured and reduced to a single number or IQ score. He was disturbed by the nearly

exclusive stress in school on two forms of symbol use: linguistic symbolization and logical mathematical symbolization. Although these two forms are obviously important in a scholastic setting, other varieties of symbol use also figure prominently in human cognitive activity within and especially outside of school. (Gardner and Hatch, 1990) He felt that intelligence was being defined too narrowly and instead proposed the existence of at least seven basic intelligences. These seven aptitudes have more to do with the capacity for solving problems and fashioning products in a context rich and naturalistic setting than with the practice of taking a person out of his natural environment and asking him to do isolated tasks he'd never done before and probably would never choose to do again. (Armstrong, 1994)

Gardner's model provides a means for mapping the broad range of abilities that humans possess by grouping their capabilities into the following seven comprehensive categories or intelligences: Linguistic, Logical-mathematical, Musical, Spatial, Bodily-kinesthetic, Interpersonal, and Intrapersonal. (Armstrong, 1994) Linguistic Intelligence includes the ability to use words effectively, either orally or in writing. Logical-mathematical Intelligence describes the capacity to use numbers effectively and to reason well. Spatial Intelligence includes the ability to perceive the visual-spatial world accurately and to perform transformations upon those perceptions. Bodily-kinesthetic Intelligence demonstrates expertise in using one's whole body to express ideas and feeling, and facility in using one's hands to produce or transform things. Musical Intelligence is the capacity to perceive, discriminate, transform and express musical forms. Interpersonal Intelligence

is the ability to perceive and make distinctions in the moods, intentions, motivations, and feelings of other people. Intrapersonal Intelligence is self-knowledge and the ability to act adaptively on the basis of that knowledge. (Armstrong, 1994) The MI theory does not profess to identify individuals as a certain "type" of intelligence. Rather, it describes cognitive functioning and proposes that each person has different levels of capacity in each separate intelligence. Gardner points out that no single intelligence exists by itself in life (except perhaps in very rare instances in savants and brain-injured individuals). Instead, intelligences are always interacting with each other. (Armstrong, 1994)

In comparing Gardner's MI theory to other learning styles theories, the difference lies in the underlying structure. While many other learning styles models tend to be process oriented, Gardner's approach is particularly geared to discover how the mind operates on the contents of the world (e.g., objects, persons, types of sounds, etc.). MI theory is a cognitive model that seeks to describe how individuals use their intelligences to solve problems and fashion products. Beyond the descriptions of the seven intelligences and their theoretical underpinnings, two particular aspects of the model are important to remember. First, each person possesses all seven intelligences and secondly, most people can develop each intelligence to an adequate level of competency. Whether or not intelligences develop depends on three major factors: biological endowment, personal life history and cultural and historical background.

In practice, MI theory stresses that schools place equal emphasis on all seven areas of intelligence. The theory provides a context within which



educators can address any skill, content area, theme, or instructional objective, and develop at least seven ways to teach it. (Armstrong, 1994) Curriculums can follow innumerable avenues by simply translating any material to be taught from one intelligence to another. MI theory proposes a means of building educational programs in such a way that all children can have their strongest intelligences addressed at least some of the time.

Howard Gardner repeatedly points out that standardized tests measure only a small part of the total spectrum of a person's abilities. Since no test can accurately determine the nature or quality of a person's intelligences, the best way to assess multiple intelligences is through a realistic appraisal of performance in the many kinds of tasks, activities and experiences associated with each one. When using a tool, such as the MI Inventory for Adults (Armstrong, 1994), it is suggested that an individual reflect upon the real life experiences he or she has already had rather than statically performing an artificial learning task. When utilizing an inventory of this type, it is important to remember that this exercise is not meant to be a "test" and that quantitative information is irrelevant to the determination of intelligence or lack thereof in each category. Rather, the purpose of the inventory is to connect the individual and her or his own life experiences with the seven intelligences.

Gardner denounces the traditional dependence which educators have on formal standardized or norm-referenced tests as very limiting. He suggests that most "testing" be replaced by authentic measures of assessment which are criterion-referenced, bench marked, or ipsative (comparing a student to her or his own past performances). He further feels that authentic measures

allow students to freely demonstrate their knowledge in a context which more closely parallels real life. Through the use of observation and documentation (e.g., anecdotal records, work samples, audio and video recordings, student journals, checklists, etc.) student performance can be evaluated in multiple ways. Just as the theory suggests that any instructional objective can be taught in at least seven different ways, so too does it imply that any subject can be assessed in at least seven different ways. (Armstrong, 1994)

Beliefs, attitudes, and values are at the heart of what is meant by culture. They are also at the heart of concern about individual differences within cultural similarities. Beliefs, attitudes, and values have developed out of shared and unique past experiences, and they strongly influence (while being influenced by) behavior and perceptions of the world. These three components may be viewed together as an integrated cognitive system. Change in any one of the three parts of the system will affect other parts and is likely to result in change in behavior. (Bennett, 1990)

When examining the role which culture plays on the topic of learning styles theory, one question continuously surfaces. Do students of certain ethnic, racial, and/or cultural groups have a common learning style? This has been a controversial subject since learning style concepts were first applied to classrooms. (Guild, 1994) One reason that the linkage between culture and learning styles is controversial is that generalizations about a group of people have often led to naive inferences about individuals within that group. Although people connected by culture do exhibit a characteristic pattern of style preferences, it is a serious error to conclude that all members of the group have the same style traits as the group taken as a whole. (Guild, 1994)

Other sources of controversy over the culture/learning style connection are sensitivity surrounding attempts to explain the persistent achievement differences between minority and nonminority students, the bigotry and narrow-mindedness of some standardized tests, the tendency of some researchers to ignore the connection between the individual and his or her culture, and the belief that identifying common learning patterns for certain cultural groups perpetuates stereotypes and ultimately does harm to children.

Five cultural factors have been identified that appear to have an affect on learning styles: Socialization Process- the control a society exercises over its children, Sociocultural Tightness- the social structures society exerts over its people to conform, Ecological Adaptation- a society's dependence upon keen observations of the environment, Biological Effect- particularly nutrition and physical development, and Language- the degree to which a society is literate.

Learning styles have been identified as an important variable in the school success (or failure) of ethnic minorities in the United States. The fact that our schools tend to be monoethnic, despite the array of diverse learning styles associated with different ethnic groups, helps explain the high drop-out rates among Blacks, Hispanics, and Native Americans. Further, consideration of learning style characteristics of several ethnic minorities will illustrate how they are often incongruent with learning styles accepted in our schools. (Bennett, 1990) Despite the almost overwhelming concurrence among researchers regarding the importance of the link between learning styles and cultural diversity, the Dunns do not acknowledge a relationship between styles of children and their parents or siblings.

Finally, the ethnicity of a person is not a forecaster of learning styles, but the cultural norms and values prevalent in the person's experience would be inclined to shape some of her or his behavior. Each individual is a unique person, but we resemble people in certain groups by virtue of our common experiences. (Guild, 1994)

### Summary

Students differ in the way they approach learning. Some work well in groups; others prefer to work alone. Some need absolute quiet in order to concentrate; others do well with noise and movement. Some need a great deal of structure and support; others are more independent and self-motivated. Some students grasp oral instructions quickly; others need to see the instructions in writing. Some require a warm personal rapport with the teacher; others do not. Some are intuitive; others prefer inductive or deductive reasoning. Some learn best in a formal environment, while others prefer a more relaxed atmosphere. The list of differences could go on. (Bennett, 1990)

The work on learning styles has centuries old roots in Hippocrates' discussion of temperaments. Psychologists have long been interested in individual differences and have described patterns in people's personalities.

Since the late 1960's, these theories about individuality and learning have been infused with new energy and insights, and the phrase "learning styles" has been used to describe them. (Guild, 1994) Only recently has the utility of this research been made known to educators. Typically, educators

look for emotional reasons to explain why a child is not learning. They look for an emotional block or conflict, or a learning disability. Many teachers ignore the possibility that children are not learning because they are not given an opportunity to use their own style of learning in the classroom. (Bennett, 1990)

The field of learning styles now is rich with the work of a plethora of talented theorists, researchers and practitioners, several of whose major contributions were highlighted:

- Cognitive style differences of field dependence and field independence, described in the early '40s by Herman Witkin and his associates, have been thoroughly researched in the last 50 years and applied to education in a variety of arenas.

- David Hunt researched the relationship between structure and learning styles.

- The work of Ramirez, Casteneda, Halverson, and Gray revealed that certain learning styles tend to be predominant in specific cultures. They also found that field-sensitive and field-independent learners are affected by cognitive style and cultural differences.

- Rita and Kenneth Dunn carefully observed students' classroom behavior and described patterns in students' environmental, emotional, sociological, and physical needs. They have used a diagnostic-prescriptive

approach to help teachers respond to a variety of learning styles.

- Anthony Gregorc has articulated the importance of "mind styles", describing fundamental psychological differences in people's perception and processing.

- Bernice McCarthy has taken the work of David Kolb and built a systematic learning cycle in which each of four types of learners are accommodated in turn during a lesson or unit. She has overlaid the hemisphericity of the brain to bring that dimension to her work.

- Howard Gardner has described seven intelligences and the various learning approaches used by people with strengths in each of the areas.

According to a great deal of research, there is a connection between culture and learning styles. To provide equitable learning environments, teachers must be aware of both individual and cultural differences. (Bennett, 1990) The interaction between these two differences is quite necessary. Teachers who remain unaware of the existence of cultural differences may misinterpret a student as having a learning disability or as being unacceptably deviant. Educators must also remain keenly aware of the diversity which is present in any one ethnic group so as to guard against stereotypes. Finally, teachers must remain steadfast in their vigil to identify the similarities among individuals in their classrooms, regardless of their ethnic or cultural backgrounds. Only in this way, through the cognizance of students as

separate entities, having individual backgrounds, styles, and needs, can all learning styles be accommodated.

## Chapter Three

As the research in Chapter 2 revealed, there is a seemingly endless variety of theories related to learning styles. In an effort to make sense of this information and design a study which has merit and the potential to yield serviceable data, the intention of this particular endeavor is to focus on the intrinsic value of learning styles in the elementary classroom.

### Sample

The sample consists of a Study Group and a Control Group. The heterogeneous Study Group consists of a self-contained first grade class comprised of 20 students, ages 6 and 7. There are 11 girls and 9 boys of which 2 are African-American, 3 are Asian-American, and 15 are Caucasian. The heterogeneous Control Group consists of a self-contained first grade class which is also comprised of 20 students, ages 6 and 7. There are 12 girls and 9 boys of which 3 are African-American, 3 are Asian-American, 1 is Hispanic, and 13 are Caucasian.

Both groups' abilities are appropriately varied. In the area of language arts, the students' abilities range from emergent readers/writers to independent



readers/writers. Using Piaget's Theory of Intellectual Development as a reference, the students' mathematical abilities range from Preoperational Thought to Concrete Operations, with some children demonstrating the ability to think abstractly.

These classes belong to an elementary school which is located in Lawrenceville; a town in Mercer County, New Jersey. The economic status of the community in which the children reside is predominantly upper-middle class. Each of the subjects, except for one in the sample group, comes from a family which is currently intact. Their parents are interested and supportive. Many are extremely involved in their children's educational process, both academically and socially.

### Measures

Two operational measures will be used during the course of this study: the Learning Style Inventory-Primary (LSI-P), and the Test of Academic Performance (TOAP).

Several major theorists have stressed the importance of identifying each student's particular learning style in order to better capitalize on their individual strengths. The LSI-P, written by Dr. Janet Perrin, is an individual, hand scorable questionnaire that assesses the learning style preference of young children in kindergarten through grade 2. The inventory consists of 12 charts, each containing pictures and a series of questions to determine students' preferences in environmental, emotional, sociological, and physiological areas. The administration manual states that information gained

from the inventory should be combined with observations and experimentation in order that teachers may design an instructional program based on the learning characteristics of every child. The LSI-P was studied in 1991 to determine test-retest reliability with the use of 300 first and second grade students. Results were given as percentages of students who did not change their preferences from the initial test to the retest. These percentages ranged from 100% to 55% with a mean score of 79%.

Our basic premise regarding the possible effects of learning styles instruction on academic achievement necessitates the use of a measurement tool which specifically focuses on academic growth. Due to the large number of subjects being assessed at the conclusion of this study, the time available will not be adequate for a comprehensive measure of individual academic achievement. As a result, we needed to use a test designed to incorporate brevity and simplicity of administration along with the technical adequacy necessary for us to utilize the assessment tool with confidence. The TOAP was developed by educators and psychologists to quickly estimate a student's level of academic achievement.

According to the manual, the TOAP was designed to provide highly relevant information in a short time. It includes a quick and reliable assessment of achievement in four curriculum areas: mathematics, spelling, reading and writing. The TOAP samples academic content in formats typically used in classrooms. Spelling is assessed through dictation, mathematics through computation, and reading through both decoding (word recognition) and comprehension of material read silently. Two of the subtests given (Spelling and Mathematics) can be administered to groups of students.

The Reading Recognition and Reading Comprehension subtests require individual administration.

The TOAP was standardized on a group of 3,216 students which attempted to represent the total U.S. population as closely as possible in the areas of grade, age, sex, race, Spanish origin and region. A full array of normative information, including scaled scores, age and grade based standard scores, percentile ranks and grade equivalents were derived for each subtest.

Since our use of the TOAP, in this instance, is to compare the achievement of individual students between two groups, we were particularly interested in the published reliability scores which refer to internal consistency. The internal consistency coefficients, found in the TOAP manual, yielded adequate data which was useful to our purpose. The coefficients that proved beneficial for our study, were listed according to age intervals. Coefficients for ages 6 and 7 were noted: (Mathematics, age 6 - .83, age 7 - .86; Spelling, age 6 - .83, age 7 - .84; Reading Recognition, ages 6 and 7 - .88; Reading Comprehension, age 6 - .76, age 7 - .73).

### **Design**

The design of this experiment encompasses an instructional program which is based on the learning style characteristics of each child within the Study Group. This group will be instructed using their particular strengths as a guide. The Control Group, on the other hand, will receive typical first grade instruction, using the same curriculum as the Study Group, but without any deference to individual learning styles.

On October 26, 1994, learning styles instruction was gradually implemented in the classroom of our Study Group. This implementation took approximately two weeks. The teacher read a book called "Elephant Styles" to the class and followed-up with a brief discussion about learning styles. The physical environment of the classroom was altered significantly. A refrigerator was put in the classroom permitting the children to snack freely throughout the day. A "private area", featuring a curtained enclosure, was constructed. A well-lit area using desk lamps was made available to the students. Lap desks were brought in for those who need to sit on the floor while working. An old-fashioned claw-footed bathtub was obtained to create a comfortable and inviting reading area. Head phones, designed to muffle sound, were made available for students who need a quiet environment in which to work.

Each child in the Study Group was given the Learning Style Inventory-Primary Version, by Janet Perrin, Ed. D. The inventory was administered individually and the results revealed environmental, emotional, sociological, and physiological preferences. The teacher in charge of the Study Group used this information combined with various techniques from several other learning styles theories in order to create an appropriate, practical instructional program. The learning styles theories that were chosen for this particular study are: Thomas Armstrong's interpretation of Howard Gardner's Theory of Multiple Intelligences, and Rita and Kenneth Dunn's Theory of 18 Determining Elements. These paradigms were selected mainly because of their adaptability to and suitability for a first grade class.

Upon completion of approximately six months of learning styles

instruction, the Study Group and the Control Group will be assessed to determine levels of academic achievement. Each child in each class will be assessed using four subtests (Mathematics; Spelling; Reading Recognition; and Reading Comprehension) from the Test of Academic Performance. Scores collected from both groups will then be compared to determine if, in fact, learning styles instruction has had any effect on the academic achievement of the Study Group.

### Statistical Treatment of the Data

In order to determine if a significant difference exists between the achievement of children receiving the treatment program i.e. learning styles instruction vs. traditional instruction, the interval estimation procedure described by Glass and Stanley (1970, pp. 256-261) was utilized. The computational formula follows here;

$$\bar{x} - (1.64 \frac{\sigma}{\sqrt{n}}) < \mu < \bar{x} + (1.64 \frac{\sigma}{\sqrt{n}})$$

where:

$\bar{x}$  = sample mean

$\sigma$  = population standard deviation

$\mu$  = population mean

## Summary

Through the comparison of two separate groups of first grade students, we hope to adequately assess the effect which learning styles instruction might have, if any, on achievement levels. Both groups of students will follow identical curriculums. Only one class, heretofore known as our Study Group, will receive instruction which has been adjusted to allow for the individual learning style preferences of each student. These preferences will be identified through the use of the Learning Styles Inventory-Primary Version. The other class, known as our Control Group, will be instructed as usual with no overt allowances being made for individual learning styles. At the culmination of an approximate six month time frame, each student, in both the Study and Control Groups, will be administered selected subtests from the Test of Academic Performance. Standard scores yielded in the Mathematics, Spelling, Reading Recognition and Reading Comprehension areas will then be collated to determine any divergence in academic growth.

## Chapter Four

### Analysis of the Results

After implementing learning styles instruction in a regular education first grade class for approximately six months and comparing academic achievement with a control population, students in the "learning styles" classroom did not demonstrate an overall significant increase on an individually and group administered assessment device. However, one out of the four subtests given revealed a significant increase in scores favoring the Study Group.

Four subtests of the Test of Academic Performance were administered to the Study Group as well as the Control Group. The Mathematics and Spelling subtests were administered to groups of ten students. The Reading Recognition and Reading Comprehension subtests were administered individually.

Results obtained from each TOAP subtest were then compared to determine if a significant difference existed between the mean scores of the Study Group and the Control Group. Mean scores were compared through confidence intervals. If the intervals did not overlap, then a significant difference was found to exist.

**Table One**

**Comparison of Study and Control Groups'  
Mean Achievement in Mathematics**

	Standard			Significance
	Mean Score	Deviation	Interval	
Study Group	93.9	15	88.09 - 99.71	NS*
Control Group	91.2	15	85.36 - 97.04	NS*

\* Not significantly different at the .05 level of confidence, two tailed test.

**Table Two**

**Comparison of Study and Control Groups'  
Mean Achievement in Spelling**

	Standard			Significance
	Mean Score	Deviation	Interval	
Study Group	85	15	90.81 - 79.19	NS*
Control Group	84.6	15	90.41 - 78.79	NS*

\*Not significantly different at the .05 level of confidence, two tailed test.



**Table Three**

**Comparison of Study and Control Groups'  
Mean Achievement in Reading Recognition**

	Mean Score	Standard Deviation	Interval	Significance
Study Group	83.6	15	89.41 - 77.79	NS*
Control Group	81.9	15	86.71 - 76.09	NS*

\* Not significantly different at the .05 level of confidence, two tailed test.

**Table Four**

**Comparison of Study and Control Groups'  
Mean Achievement in Reading Comprehension**

	Mean Score	Standard Deviation	Interval	Significance
Study Group	68.9	15	74.71 - 63.09	S*
Control Group	51	15	56.81 - 45.19	S*

\* Significantly different at the .05 level of confidence, two tailed test.

### Summary

Through the use of comparative scores obtained from four subtests (Mathematics, Spelling, Reading Recognition and Reading Comprehension) of the TOAP, the Study Group's scores revealed a significant increase on only the Reading Comprehension subtest. Therefore, the implementation of learning styles instruction in a regular education first grade classroom did not demonstrate a significant rise in academic achievement when compared to a similar first grade class receiving typical instruction.

## Chapter Five

### Summary, Conclusions, Discussion, and Recommendations

According to the National Task Force on Learning Style and Brain Behavior, the following definition of learning styles has been adopted with the understanding that it would be revised if necessary:

"Learning style is that consistent pattern of behavior and performance by which an individual approaches educational experiences. It is the composite of characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment. It is formed in the deep structure of neural organization and personality that molds and is molded by human development and the cultural experiences of home, school, and society." (Bennett, 1990)

The work on learning styles has centuries old roots in Hippocrates' discussion of temperaments. Psychologists have long been interested in individual differences and have described patterns in people's personalities.

Research shows that every person has a learning style. Some learning

styles are biological and some are developed through experiences. There is a connection between culture and learning styles. More than twenty years of work on learning styles theory has confirmed that the way teachers present information can determine whether learning occurs.

Learning styles instruction evokes a wide range of emotions among educators. These emotions range from dismissive skepticism, to "throw the baby out with the bath water" conversion, and reach as far as full-blown fanaticism. However good the intention of learning styles instructors and theorists may be, the results should be demonstrated through significantly higher academic achievement in order to make the attempt worthy of the effort.

### Summary of the Data

Two operational measures were used during the course of this study: the Learning Style Inventory - Primary (LSI-P), and the Test of Academic Performance (TOAP). The LSI-P was administered individually to determine each student's preference in environmental, emotional, sociological and physiological areas. The teacher in charge of the Study Group used this information, combined with various techniques from several other learning styles theories, in order to create an appropriate and practical instructional program. The Control Group was instructed as usual with no overt allowances made for individual learning styles. After approximately six months of learning styles instruction, the Study Group and the Control Group were assessed to determine levels of academic achievement using the TOAP.

Each child in each class was assessed through the administration of four subtests from the TOAP. Due to scheduling constraints placed on the teachers, and student absences, data was obtained from 18 subjects in each group rather than 20. Standard scores yielded in the Reading, Mathematics, and Language areas were then collated to determine a divergence, if any, in academic growth. We found that there was no significant difference in the areas of Mathematics, Spelling and Reading Recognition between the Study Group and Control Group. However, in the area of Reading Comprehension, a significant difference surfaced favoring the Study Group.

### **Conclusions**

The following conclusions have been based on detailed analysis of the information collected through age-based standard scores from selected subtests of the TOAP:

- Although the Study Group achieved a slightly higher mean score than the Control Group in each subtest, statistical analysis of these scores, through the use of Glass and Stanley's interval estimation procedure, did not indicate the presence of a significant difference in the Mathematics, Spelling and Reading Recognition subtests.

- Identical analysis of the scores from the Reading Comprehension subtest yielded a significant difference, which favored the Study Group.

- Since our analysis of the TOAP subtest scores showed a significant difference in only one out of four subtests given, our hypothesis, which states that upon completion of implementing learning styles instruction in a regular education first grade class and comparing academic achievement with a control population, students in the "learning styles" classroom will demonstrate an increase on an individually and group administered assessment device, was proven to be null.

### **Discussion**

During our study we learned a great deal about learning styles, which in turn raised many questions from our perspectives as classroom teachers. Some of the theoretical strategies were realistic and practical. However, many of the practices were, in our opinions, idealistic and implausible.

### **Pros**

Some methods suggested by learning styles theorists that we found to be important, relevant, and highly useful were as follows:

- Teachers should become aware of each child's learning style and the various types of learning styles.
  
- Teachers should present material in a variety of ways.

- Rita and Kenneth Dunn's belief that environmental, emotional, sociological, and physical stimuli should be taken into consideration and altered or modified to benefit the needs of the wide assortment of learners proved helpful. For example, food was made available throughout the day for the Study Group to assist any children whose learning style required intake to enhance learning. It was interesting to note how the children spontaneously regulated their level of food intake to suit their individual needs. The private, curtain enclosed area of the classroom, which was established to accommodate those students who worked more efficiently when free from distracting influences, became a consistent favorite of only a handful of students. We were also pleased to note that the comfortable and inviting bathtub became very popular as an incentive for the students to curl up with a good book.

- Anthony Gregorc's lauding of the practice of team teaching, which seems to be an excellent means of accommodating the differences between teachers' styles and students' needs also seemed to enhance student learning. If one teacher does not reach a particular student, perhaps another will.

- Bernice McCarthy's "celebration" of differences in learning styles is essential for teachers to acknowledge. She believes in teaching to a child's learning style as well as challenging students in an area which may not be as comfortable as their particular style.

- Howard Gardner's theory which stresses that schools place equal emphasis on all seven areas of intelligence has challenged not only the ways in which we see ourselves and our children, but also the ways in which we teach and learn.

- Many theorists have validated the linkage between culture and learning styles. To provide equitable learning environments, we feel strongly that teachers should become aware of both individual and cultural differences.

### **Cons**

Some methods suggested by learning style theorists that we found to be impractical and unrealistic were as follows:

- First grade students, in general, do not seem to possess the metacognitive abilities necessary to accurately determine their personal learning styles.

- Rita and Kenneth Dunn's seemingly Utopian vision of their learning style program which puts teachers in the accountable position of effectively teaching children by simply redesigning a classroom to respond to individual learning style differences is an idea that we found to be disastrously naive. In practice it is much more involved than merely rearranging a classroom. We disagree with the Dunns' suggestion that each child should be taught to her or his strongest learning style, rather than strengthening areas which are weak.



We also found that their LSI-P was somewhat confusing and revealed inaccurate results.

- Anthony Gregorc's intense and profound ideas about personal awareness are geared towards older children and adults rather than younger children who seem to be still in the process of developing personal awareness.

- Bernice McCarthy's systems approach to learning style implementation is hard to untangle. Although she has many worthy ideas, her method, in our opinion, is complicated, difficult to analyze, and requires an entire curriculum revision to implement.

Paramount to all learning styles theories, we believe that teachers must recognize and endeavor to utilize available information to meet the diverse needs of today's universal population of multifaceted learners.

### **Recommendations for Further Study**

The following recommendations are offered for future consideration.

1. The administration of an achievement test at the onset of the study as well as at the conclusion could provide baseline data from which to determine statistical significance.

2. Other studies in this vein may benefit from an increased adult per child ratio within the Study Group.

3. The results of this study indicate a possible relationship between the subjects' ages and their inability to determine their own learning styles. Interesting parallels might be drawn between the subjects used in this study and a slightly older group of subjects in an identical study.

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