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Right Brain Study

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Right Brain Study

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ABSTRACT

Many children in our schools are experiencing failure due primarily to the fact that they process information on the right side of the brain. According to research our schools teach to the left side of the brain Stahl-Gemake and others (1982).

The purpose of this study is to show that instructional methods designed for right-brained students will make a significant difference in the reading achievement scores of the students when compared with the scores of right-brained sixth grade students not receiving these instructional methods.

The subjects were sixth grade students who use the right hemisphere of the brain to a greater degree than the left hemisphere. The subjects' cerebral preference was determined by a test known as the Cerebral Preference Index (CPI). Ten students each were chosen from two sixth grade classes. The study consisted of a Control Group and Experimental Group. During the study the Control Group received eight weeks of the regular school's program while the Experimental Group received eight weeks of instructional strategies that take hemispheric specialization into consideration. The results indicated that there was no significant difference in the
reading achievement scores of those students who received the instructional methods designed for right brained students. The analysis of data did suggest that those scoring high on the pre-test scored high on the post test. The results indicated the same outcome for low scorers.
CHAPTER 1

Problem Statement

Is there a significant relationship between reading achievement scores of right-brained sixth grade students who have been given the proper balance of instructional strategies, that take hemispheric specialization into consideration and those right-brained sixth grade students who have not been given the proper balance of instructional strategies, that take hemispheric specialization into consideration.

Rationale

The human brain is composed of two interdependent systems, the left hemisphere and the right hemisphere which are connected by a neural bridge called the corpus callosum. These nerve fibers transmit messages from one side of the brain to the other. According to Saks (1977) each hemisphere has a unique information processing style and mode.

If a child is right-brained, that is he or she uses the right hemisphere of the brain to a greater extent than the left hemisphere, then this child's learning style is whole-to-part, or holistic. He or she starts with the answer or sees the whole pattern and discovers a divergent conclusion. He or she has difficulty with sequential
thought. The right hemispheric child must have concrete experiences. He perceives through the senses by doing, touching, and moving. Since feelings and emotions are in the right hemisphere, when these children are asked to retell a story they may seem to exaggerate, in our terms, but they are just being themselves. These children are intuitive; that is, the answers come to them out of nowhere and they are usually unable to explain how they arrived at the answer. These children have difficulty expressing themselves, and often try to change the environment to meet their needs. The right-brained child has no sense of time. That's why he usually does not complete his work on time (Vitale, 1982).

In contrast, the left-brained child uses the left hemisphere to a greater extent than the right hemisphere; thus, this child's learning style is part-to-whole, or linear. He or she takes little pieces and organizes them in logical order, and discovers a convergent conclusion. The left-hemispheric child can think in symbols and is usually very expressive. He or she has a good sense of time, and is capable of adjusting to the milieu. Both hemispheres use high level cognitive skills, but their approach to life is very different (Vitale, 1982).
Stahl-Gemake (1982), Yellin (1982), Vitale (1982), Hutson (1981), and Samples (1977) found that education appears to be dominated by a left-brained curriculum. This means that we teach to the student who has a dominant left hemisphere and little is being done to use the potential strengths of the child who has a dominant right hemisphere. The child, therefore, that processes information mostly in the right hemisphere is usually at a disadvantage. It appears that the educational system has neglected these alpha children by presenting to them a curriculum lacking holistic and experienced based approaches to literacy. According to Gazzaniga (1977) children who have been classified as gifted, talented, or disabled in reading and writing skills, may be predominantly right hemisphere learners. Thus, non-verbal visual-spatial strategies should be a part of their reading and writing training if they are to succeed. Learning styles seem to be affected by the child's dominant hemisphere; therefore, if either hemisphere is limited in its processing ability the picture is not whole and the individual's perspective is limited.

According to Stahl-Gemake (1982), the current philosophy permeating education was brought about as a
result of elementary and high school students' unsatisfactory scores on standardized instruments, as well as a growing public concern. These events fostered a back-to-basics movement and demanded teacher and administrator accountability. Back-to-basics refers to a return to the "3Rs" - reading, writing, and arithmetic. Curricula that stress the "3Rs" educate only one hemisphere of the brain, while leaving half of an individual's intellectual capabilities in a recessive state.

Children that are right-brained can meet success in a curriculum that uses the holistic or right-brained approach to learning. This approach to learning takes into consideration the physical, the emotional and the cognitive abilities which not only educate the right brain but the left brain as well (Yellin, 1982). So, if curricula were redesigned to fit the brain processes then fewer children would suffer failure due to instructional strategies that do not take hemispheric specialization into consideration. Even though education and society are not enthused over the holistic approach (Yellin, 1982), they must be made to realize the importance of this method. The holistic approach is greatly concerned with the children who are
experiencing difficulties understanding new concepts that are introduced in the school setting. Utilization of the right-brained approach to learning will strengthen the right hemisphere and possibly create a more intelligent being.

The purpose of this paper, then, is to show that instructional methods designed for right-brained students will make a significant difference in the achievement scores of the students when compared with the scores of right-brained sixth grade students not receiving these instructional methods.

A second intent is to demonstrate the importance of providing for right-brained experiences during instruction, so that there will be an integration of both hemispheres to create a more intelligent and productive individual.

Summary

Ronald Shook (1981) writes that the different functions of the hemispheres are simply assumptions which have been accepted as facts by researchers. He concludes that the two-brain theory has very little significance in planning education. The altercations may never be dispelled, but they can be validated.

Through this study, possibly, will come a small
ray of light, which will help in casting out the
darkness which has so long enshrouded the right-brain
capabilities. Even a small ray of light has its greatest
effect in a very dark room. The controversy continues
to flow as a river does. Soon it will spread out and
slow down, and then, only then will the right brain
have a chance to manifest its great intellectual
abilities.
Definition of Terms

ALPHA CHILDREN: The alpha child is right-brained and creatively different (Vitale, 1982). The word alpha refers to the bank of EEG wave patterns in the range of 8 to 13 cycles per second (Hz), usually taken to indicate a lack of active thinking (Segalowitz, 1983).

ARBORIZATION: Arborization occurs when the cells of the brain increase in size and branch out to form patterns that look like trees (Cramer, 1981).

AUDITORY LEARNER: An auditory learner comprehends primarily by hearing.

COMMISSUROTOMY: Commissuromy is the cutting of the corpus callosum and possibly other cerebral commissures as well (Segalowitz, 1983).

CORPUS CALLOSUM: The corpus callosum is the primary communication conduit between the hemispheres. A massive bundle of nerves, containing some 200 million fibers, that send messages from one half of the brain to the other (Hutson, 1981 and Russell, 1979).

DICHOTIC LISTENING: Dichotic listening is a task designed to assess hemisphere specialization by sending simultaneous input to the two ears (Segalowitz, 1983).

DOMINANT HEMISPHERES: Dominant hemispheres refers to the tendency for one hemisphere to control the processing
of information in a particular task. It is often used to refer to the hemisphere controlling speech (Segalowitz, 1983).

**ELECTROENCEPHALOGRAPHY:** (EEG) is used widely in the study of hemispheric processing and provides a direct measure of brain activity (Staley, 1980).

**HAPTIC LEARNER:** A haptic learner must learn mainly by experience.

**HEMISPHERICITY:** Hemisphericity is the tendency to be dominant and independent of the task.

**HEMISPHERIC SPECIALIZATION:** Hemispheric specialization means that the two halves of the brain have different functions and are different in the ways they relate to the world. Learning preferences based on the functional differences between hemispheres (Vitale, 1982).

**HOLISTIC:** Holistic means whole-to-part. The right-brained individual starts with the total concept and discovers a divergent conclusion (Vitale, 1982).

**LATERAL INTEGRATION:** Lateral integration is the stage when the two sides of the brain begin to interact so that the child can process something in the left visual left field, send it to the right, transfer it over to the left brain, interpret it and deal with it on a manipulative or written level (Segalowitz, 1983).
LATERALIZATION: Lateralization refers to how good each hemisphere is at a particular task (Segalowitz, 1983).

LEFT-BRAINED: Left-brained refers to the dominant hemisphere, the side in which most of the processing of information is occurring (Vitale, 1982).

LINEAR: Linear means part-to-whole. The left-brained individual takes little pieces and arranges them in logical order to arrive at a convergent conclusion (Vitale, 1982).

MODE OF CONSCIOUSNESS: Mode of consciousness refers to two separate and unique ways of processing stimuli (i.e., left hemisphere: linear, symbolic, sequential, logical, etc., right hemisphere: holistic, concrete, random, intuitive, etc...) (Vitale, 1982).

RIGHT-BRAINED: Right-brained refers to the preferred or stronger hemisphere. The side in which most of the processing of information is occurring (Vitale, 1982).

SPECIALIZATION: Specialization occurs when each brain develops strengths in different cognitive functions.

VISUAL LEARNER: A visual learner is one who comprehends mainly by seeing the picture.
CHAPTER 2

Hemispheric Brain Research

According to Frederick Staley (1980), as early as the 1700s scientist recognized that the human brain had two sides or hemispheres. Initially it was believed that the two sides performed the same functions and that in most individuals the left hemisphere was dominant.

Through the studies of Broca (1865), Wernicke (1874), Kimura (1961) and Sperry (1975) involving lesion studies, anatomical studies, split-brain research, dichotic listening, tachistoscopic studies, reaction time and sodium amytal, and electroencephalography, there is strong evidence that the two hemispheres are responsible for different functions. The left hemisphere is capable of logical, analytical and linear thought. It has control of the right side of the body. Some other functions are reading, writing, mathematics, time sense, order and verbalizing.

The right hemisphere is, in effect, nonverbal. It controls the left side of the body as well as dreaming, touch, visual memory and emotions. Its thought processes are intuitive, imaginative, metaphoric, and holistic. Aesthetics, art, and
music appreciation are prominent attributes of the right cerebral hemisphere. The right brain is considered to be mundane, while the left brain is thought to be the more intelligent of the two (Staley, 1980).

Kimura's study involving dichotic listening (cited in Segalowitz, 1983) helped to verify the existing beliefs that the hemispheres are unique. Also, during the 1960s Roger Sperry performed split-brain surgery on epileptic patients in an attempt to decrease seizures. He found that by cutting the corpus callosum, the individual's visual perception and other functions had been divided into two separate modes. One side of the brain was not aware of what the other side was doing. Each hemisphere had its own way of thinking and processing information. Physical tasks could only be performed by the individual if they were presented to the hemisphere that carried out this function. Even when both hemispheres received the same stimuli, they arrived at different results.

Sperry concluded that both hemispheres can achieve virtually the same potential. Yet, there is one difference between the two hemispheres and that is the left brain's ability "to talk" about the
experience (Maurer, 1982).

Tachistoscopic investigations reveal that both hemispheres are competent at reading concrete nouns and adjectives, but the left hemisphere is better able to process verbs, abstract nouns, and adjectives (Levy, 1983). Levy agrees with the research that the two hemispheres perform different functions, but does not accept the assumptions and implications. He refers to them as false assertions lacking scientific evidence. Levy and Leaffer (1981) argue that both hemispheres have always worked together. The processes that are carried on by the brain are so integrative that we can not determine which side of the brain is doing the work.

Hemisphericity for curriculum and instruction implies that there is a need to determine the brain dominance for each student. There are also implications that we should deal with boys and girls differently and prepare materials that take into account varied learning styles (Edwards, 1982). Grady (1983) believes that the ability to solve problems may show an increase if, through hemispheric research, we stress the value of right hemispheric skills.

**HEMISPHERIC SPECIALIZATION**

In the mid-nineteenth century Broca (1865) discovered
that localization of language was in the left hemisphere. Since then, others have succeeded in identifying many functions of the two hemispheres.

The left hemisphere is sequential and linear, whereas the right hemisphere is intuitive and visual. Hemispheric specialization allows the two halves of the brain to specialize in different functions. Right hemisphere specialization is less apparent in girls than boys. Most boys have a strong right hemisphere and seem to perform visual-spatial tasks (i.e., maps, charts, graphs) better than girls (Telzrow, 1981).

Hemispheric specialization is based on three theories. One theory states that the two halves of the brain are symmetrical up to the age of four (Vitale, 1982). This works as a protective device in case one side of the brain is injured. If one side of the brain is damaged the other side will take over the functions. The two hemispheres begin to specialize at the age of four and by age five specialization is complete.

The second theory states that the child's hemispheric lateralization is present at birth, but does not become evident until the corpus callosum has matured (Vitale, 1982). Specialization and
lateralization is complete at age nine. Research done by Galin and Gazzaniga (cited in Gray, 1980) supports this theory. They believe that functionally the infant begins life with two separate hemispheres and later the corpus callosum matures.

The third theory says, that lateralization exists at birth, but specialization of other functions will not be complete until puberty (Vitale, 1982). The theories represented here denote the trends dominating hemispheric research today.

Handedness, or the preferred hand is one indicator of hemispheric specialization. About ten percent of the population is left-handed (Grady, 1984). According to recent studies Bogen (1975), Sperry (1964) Russell (1979) verbal functions are lateralized in the left hemispheres for both right- and left-handers. A right-handed child may have a dominant right hemisphere or left hemisphere. This same child may also be capable of alternating back and forth in each hemisphere.

EDUCATION AND BRAIN RESEARCH

The thrust is toward educator awareness that the integration of the two hemispheres will create a state of equilibrium, increase knowledge, and provide instruction that gets results (Grady, 1984).
How does current brain research affect classroom instruction? Current brain research implies that there is a need to balance the curriculum. In this way, right hemispheric activities will be used along with left hemispheric activities to achieve a more intelligent human (Hildebrand, 1980).

Singer (cited in Staley, 1980) says that the right hemispheric involvement is critical for learning to take place. Children whose games are poor in make-believe and fantasy are likely to have trouble recalling and integrating the details of events they hear about. Johnson and Sund (1976) concluded that imagination and fantasy can change behavior as well as reasoning and remembering.

A student will process data in his or her preferred hemisphere even though that hemisphere may not be effective or may cause limitations. This may be a potential cause of learning problems in the school setting. If a student uses one hemisphere and the instructor teaches toward another, communication of ideas become intricate. The instructor seeks a specific answer, but receives nothing or an answer that even he is unable to comprehend. This is because the right brain can recognize data that should be processed in the left hemisphere. Although
both hemispheres are capable of receiving the same data, the outcomes are different (Bogen, cited in Edwards, 1982). If a student is forced to process information in a different way from his dominant functioning mode, he or she becomes disabled during the learning process (Edwards, 1982).

In a normal classroom setting the students are given oral directions to do linear tasks. Lecturing is the way the ideas are usually presented. This style of teaching does not consider the right-brained child that needs visual and tactile stimuli (Grady, 1984).

Recent research has discovered that the brain grows in spurts and not continuously until adulthood as previously believed. A prominent figure in the area of brain growth is Herman Epstein. He says that brain growth is intermittent and can be predicted by age. Epstein (cited in Cramer, 1981) suggests that we use this information to make alterations in the methods of instruction presently existing in our schools.

The growth periods, according to Epstein, are between the ages of three months to ten months; two years to four years; six to eight years; ten to twelve years; and fourteen to sixteen years. During the last four growth periods, aborization begins. There is an increase in the size of the brain cells which enables
the child to understand more complex information. The child's intellectual capability increases during each growth period.

Our schools have placed emphasis on left-hemispheric functions because of the back-to-basics movement, technology, science, and other trends of this nature. A left-brained curriculum tends to down play the right brain's superior capabilities (Gray, 1984 and Staley, 1980).

**LEARNING STYLES**

A child's learning style is the method by which he or she learns best. The research shows that some symmetry of the two hemispheres is salient in most children. There is also evidence that heredity is a major factor in determining the predominance of one hemisphere over another.

A right-hemispheric learning style is found more among boys than girls. Activities such as industrial arts, art, and music, sometime called "frills", will bring out the right-hemispheric processes (Telzrow, 1981).

A curriculum that takes into consideration the individual learning styles will probably produce individuals with high level thinking skills. Languis, Sanders and Tipps (cited in Telzrow, 1981) found that achievement scores increased when both hemispheres were
being used. Research submitted by the University of Southern California (cited in Hildebrand, 1981) also indicated higher recall scores on tests written on the first three levels of Bloom's taxonomy (i.e., knowledge, comprehension, application). What factors were attributed to the rise in scores? The students had been presented activities for both right- and left-hemispheric learning modes.

The split-brain research done by Sperry (cited in E. Gray, 1980) had great impact on the thinking style of the individual. Once the neural connections were severed, not only did they see things differently, but the left hemisphere (i.e., right side of body) was able to verbalize what it saw, while the right hemisphere (i.e., left eye and hand) was only able to point to the visual stimulus. The two hemispheres seem to have conflicting views of the stimuli presented to them. For instance, the visual cues received in the right eye are processed in the left hemisphere, and the visual cues received in the left eye are processed in the right hemisphere. Each task requires a different thinking style; thus, the individual with the split brain is unable to see the whole picture.

Studies of normal right-handers have shown that the non-verbal responses precede the verbal responses.
This may be an indication that there is some transfer of data. Apparently, the two hemispheres are working together (Filbrey and Gazzaniga, cited in Gray, 1980).

Ornstein and Galin (1976) felt that transfer of data from one hemisphere to the other was a natural occurrence. Also, when the normal right-handers were doing visual-spatial tasks the left hemisphere seemed dormant, but when these same individuals performed writing tasks the right hemisphere appeared dormant.

An educator can heighten the individual learning styles of students by utilizing varied instructional strategies. In this way the areas of study are made more meaningful as well as holistic. Why use a holistic approach? According to Vitale (1982) there are several premises to support this learning strategy.

First, the child is the center of his universe and learning takes place there. This refers to the child's brain that has residence in the child's body. Second, a child's experiences determine the amount of learning he or she can achieve. Needless to say, the more experiences, the more a child is apt to learn. Third, the learning style is influenced by the stronger hemisphere along with the modality through which the child learns best (i.e., visual, auditory, haptic).

Through the use of outdoor education, the students
are placed in a living laboratory which encourages them to select learning strategies to suit their styles. These students, through real life situations, are learning by doing (i.e., right brain). The world becomes the classroom. Environmental topics can enable the child to see the whole learning experience, while using both the left and right hemisphere. Feelings, interests, and needs all come into play when teacher and students share in the outdoor experience. Hemispheric brain research suggests that the right brain is excited by the outdoors (Staley, 1980).

In contrast to most of the accepted dogma, Jerre Levy (1983) says that the method of introducing the material is considered the learning style, and not the kind of understanding we want the child to gain, nor what hemisphere we seek to educate.

SUMMARY

TOWARD A WHOLE-BRAIN EDUCATION

As Betty Edwards (1979) states, that the neuroscientists have provided a foundation for right-brained training then we can build a school system that will teach the whole brain... Susan Garrett (cited in Staley, 1980) redefines the word "creativity" as the effective integration of both hemispheres of the brain.
Even though the right brain functions and capabilities are important to effective and creative living, the educational system prefers the left hemisphere over the right hemisphere (Staley, 1980). The attitudes which society values are executed by the left brain, but the thoughts performed by the right brain are not considered important. The right cerebral hemisphere is allowed to become known only when we are sleeping, daydreaming, or fantasizing. We have not learned to intuitively solve problems or measure the potential to imagine, see, and react to all sensory stimuli (Staley, 1980).

Through the many research projects in the area of brain functions, we can see some educational benefits for right-brained and left-brained activities being used interactively to educate the whole child. According to Hildebrand (1981), if stimulation of the entire brain is attained, we will be able to educate the whole child and enable the child to reach his highest potential.

The theories and attitudes presented in this thesis are not intended as a panacea for the problems of education. Yet, after years of research there is sufficient evidence that curriculum and instruction will benefit from this knowledge.
CHAPTER 3

Design of the Study

Introduction

There is a need for teachers to carry on the research that has been started. By becoming facilitators for the researchers, he or she can verify or nullify the present ideas of brain research. Does any of this dogma have significance? Is there really a significant relationship between the reading achievement scores of right-brained students who have been given the proper balance of instructional strategies, that take hemispheric specialization into consideration and those that are not provided this balance?

Subjects

The school in which the study was conducted has a high black enrollment. The white-black ratio is 1:4. The students have a low socio-economic background. Over fifty percent of students in each class are on free or reduced lunch. The majority of the students are transported by a school bus. The ages of the students ranged from ten to fourteen, but all are in the sixth grade.
Sampling

The students for the study were chosen by their performance on the Cerebral Preference Index (Smith and Keenan, 1982). Sixth grade classes, each consisting of thirty students, made up the pool from which the sample was chosen. The classes were randomly selected. Both classes were tested. The ten students scoring highest on the right-brained sections of the test were used in the study.

Chart:

<table>
<thead>
<tr>
<th>Class Size</th>
<th>= 30 Students in each class</th>
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<tr>
<td>Experimental</td>
<td>= 10 Students one class</td>
</tr>
<tr>
<td>Control</td>
<td>= 10 Students other class</td>
</tr>
</tbody>
</table>

Procedure

First, the Cerebral Preference Index (CPI), was administered to two sixth grade classes. Each class had thirty students. The test was used to determine the students who had a right brain preference. The ten students in each class who were determined by the instrument to have a dominant right hemisphere were chosen as subjects for the study.

The teachers of the two classes were also tested with the Cerebral Preference Index because their
cerebral preference could be a factor in the results of the study. After testing the teachers and determining the participants for the study, a pre-test was administered to the Experimental Group, and the Control Group. The Gates-MacGinitie (Gates) Reading Test, Form 1, was given in two settings. Each setting was about an hour in length. The directions were carefully read and the students practiced sample items prior to testing. After the pre-test was completed, the Experimental Group was subjected to eight weeks of instruction that allowed the students to use their dominant processing mode (i.e., right hemisphere), while the Control Group was given the school's regular instructional program.

When the instructional period was over, each group was post tested using form 1M of the Gates-MacGinitie Reading Test. The data from these test were analyzed to determine the significance of the study.

Treatment

Once the students were selected and pre-tested they remained in their regular classroom. The Experimental Group taught by Teacher V received eight weeks of instruction that took into consideration hemispheric specialization. The majority of the activities were
taken from (Grady, 1984), (See Appendix A).

The Control Group received the instruction that is normally given in the school setting during the eight week period. At the end of the eight week period, both groups were post tested using the aforementioned instrument.

**Instrumentation**

A. *Cerebral Preference Index*

This test was designed by Michael P. Smith, Ed. D. and Donna Keenan, Ph. D. University of North Florida. The booklet was developed to determine cerebral preference. The test consists of questions pertaining to visual-spatial tasks (i.e., geometric shapes) and logic by reasoning.

B. *Gates-MacGinitie Reading Test*

All items are multiple choice. All words read by the students are printed in black; color is used functionally to make distinct boundaries between items and between answer choices and to outline answer spaces. Standardization was carried out in October 1976, and May 1977. The sampling plan was based on the Fourth Count of the 1970 U.S. Census, which gives data on the basis of school district boundaries. The districts
were stratified according to (1) geographic location, (2) socio-economic status, (3) enrollment size. Each group had a representation of Black and Hispanic students. At Level D, the content of the Comprehension Test is drawn from actual published sources. All passages are written in standard English. The Gates-MacGinitie Reading Test is a power test; all but the very slowest students will have time to try every item. Alternate-forms and Kuder-Richardson Formula 20 reliability coefficients were computed for each test level. The K-R coefficients ranged from .90 to .95 for Vocabulary and from .88 to .94 for Comprehension. The basic premise of the Gates-MacGinitie Reading Test is that it is useful for teachers and schools to know the general level of reading achievement of individual students, throughout their entire school careers. This information, added to whatever else is known about the students, is an important basis for selecting students for further individual diagnosis and help, for locating students who are ready for more advanced work, and for evaluating the general effects of instructional programs.

Analysis of Data

The students were exposed to two grouping treatments so an analysis of covariance was used to measure the
changes that had taken place. (See Figures in Table 2) The data was entered in the University of North Florida's Computer System and processed through NERDC regional computer network at Gainesville, using the Statistical Social Sciences (NIE et al.; 1975). This method of analysis gave insight for determining if there was indeed a significant relationship between instructional strategies and achievement scores for the right-brained sixth grade student. The means and standard deviation for both groups were shown. (See Figures in Table 1)

The Pearson product-moment correlation coefficient (PPMCC) was used to assess the relationships between two sets of scores which have been obtained on one group of students.

The formula for computing the PPMCC is as follows:
The test and retest scores of each student are converted to Z-scores.

\[
Z\text{-Score} = \frac{\text{raw score} - \text{mean}}{\text{standard deviation}}
\]

The Z-scores are multiplied together and the mean of all those products is the correlation coefficient.

The correlation coefficient will be a number between -1 and 1 inclusive. If the coefficient is closer to 1, then the two administrations of the test is more reliable.
If the coefficient is closer to -1 the results of the two administrations of the test is less reliable.

A Scatter Diagram was used to determine the reliability of the test retest results. The diagram is divided into quadrants. If the majority of the scores fall within Quadrant I and III then the test is more reliable. If the majority of the scores fall in Quadrant II and IV the test is less reliable.

Summary

This study consisted of an Experimental Group and a Control Group of students who had a right brain preference. The Experimental Group was given eight weeks of instruction that took hemispheric preference into consideration. The Control Group received the regular program of study provided by the school. The Experimental Group was taught mainly through holistic methods while the Control Group received mainly part-to-whole instruction.

If the Experimental Group shows a significant increase in test scores over that of the Control Group, then this may indicate a significant relationship between reading achievement scores and instructional strategies for right-brained sixth graders.

Standardized test scores have only relative and not
absolute meanings because the test scores indicate how well an individual performs the task in relation to the performance of others.
The question studied was, is there a significant relationship between reading achievement scores of right-brained sixth grade students who have been given the proper balance of instructional strategies that take hemispheric specialization into consideration and those right-brained sixth grade students who have not been given the proper balance of instructional strategies that take hemispheric specialization into consideration. The raw scores of both groups are shown in Chart A. The asterisk indicates a decrease in score on the second administration of the test. This is the information that was used to compute the analysis of covariances, the Pearson product-moment correlation coefficient, the scatter diagram and the means and standard deviation.

Analysis of covariance was utilized to test whether there were significant mean differences between the reading achievement scores of the class taught by the regular method and one where specific instructional methods were given. The means and standard deviations of the two groups are presented in Table 1. The results of the analysis of covariance are presented in Table 2.
An F (a ratio between two variables related to treatment and individual differences) of 0.698 was computed and found to be not significant. Although the Experimental Group had higher mean scores on both the pre and post test than the Control Group, the differences between the means was not significant. When the two groups were equated on the basis of their pre-test scores the Control Group had a higher adjusted mean score (28.28) than the Experimental Group (26.12) (See Figures in Table 1). The method of instruction did not have a significant impact on the reading achievement scores of right-brained students.

The PPMCC correlation between the pre-test and the post test reading scores for both groups was 0.768 which was significantly past the 0.000 level. Students who tended to score high on the pre-test tended to score high on the post test. Those who had low scores on the pre-test tended to have low scores on the post test.

The Scatter Diagram showed most of the test - retest scores fell in Quadrants I and III. This indicates that the test - retest results are more reliable. (See Diagram 1)
CHART A

The Raw Scores for the Test

Retest on Gates-MacGinitie Reading Test

<table>
<thead>
<tr>
<th>Experimental Group</th>
<th>Test 1</th>
<th>Test 2</th>
<th>Control Group</th>
<th>Test 1</th>
<th>Test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shawn</td>
<td>31</td>
<td>*26</td>
<td>Larry</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>Richard</td>
<td>29</td>
<td>31</td>
<td>Jennifer</td>
<td>21</td>
<td>*15</td>
</tr>
<tr>
<td>Chris</td>
<td>30</td>
<td>33</td>
<td>Monique</td>
<td>23</td>
<td>*21</td>
</tr>
<tr>
<td>Rena</td>
<td>38</td>
<td>*36</td>
<td>Ricky</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Stephanie</td>
<td>40</td>
<td>*33</td>
<td>Tiffany</td>
<td>20</td>
<td>*12</td>
</tr>
<tr>
<td>Terrence</td>
<td>25</td>
<td>31</td>
<td>Melissa</td>
<td>27</td>
<td>39</td>
</tr>
<tr>
<td>Faison</td>
<td>26</td>
<td>*25</td>
<td>Judy</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td>Lori</td>
<td>23</td>
<td>26</td>
<td>Tim</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Cynthia</td>
<td>22</td>
<td>22</td>
<td>Monica</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Frederick</td>
<td>22</td>
<td>*19</td>
<td>Joel</td>
<td>20</td>
<td>22</td>
</tr>
</tbody>
</table>

* The asterisk indicates a decrease in score on the second administration of the test.
TABLE 1
Means and Standard Deviation of the Experimental and Control Groups on the Gates-MacGinitie Reading Test

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-Test</th>
<th>Post Test</th>
<th>Adjusted Post Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Experimental</td>
<td>28.70</td>
<td>6.25</td>
<td>28.20</td>
</tr>
<tr>
<td>Control</td>
<td>24.00</td>
<td>8.31</td>
<td>26.20</td>
</tr>
</tbody>
</table>
### TABLE 2

<table>
<thead>
<tr>
<th>Sum Of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>DF</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>20.90</td>
<td>1</td>
<td>20.90</td>
<td>0.698</td>
</tr>
<tr>
<td>Error</td>
<td>509.11</td>
<td>17</td>
<td>29.95</td>
<td></td>
</tr>
</tbody>
</table>
DIAGRAM 1

Scores from Second Administration of Test

Scatter Diagram of Test - Retest Results of 43 Point Test Sectioned Into Quadrants
Summary

The analysis of data gave no indications that there was a significant relationship between reading achievement scores and instructional strategies that take into consideration the cerebral preference. The analysis did show that the Experimental Group had higher mean scores on both the pre and post test than that of the Control Group. (See Figures in Table 1) Indications are that the Experimental Group demonstrated more capability on the reading during both administrations of the test.

The adjusted mean score for the Control Group (28.28) was higher than the Experimental Group (26.12) because fifty percent of the students in the Experimental Group had a decrease in their raw scores on the second administration of the test. (See Chart A)

The PPMCC and the Scatter Diagram showed that reliability existed between the two sets of scores. The PPMCC was 0.768 which is closer to 1 than -1. On the Scatter Diagram most of the raw scores fell in the I and III Quadrants.
CHAPTER 5

Conclusion

Although the results show no significant difference between reading achievement scores and instructional strategies that take into consideration cerebral preference, I am inclined to reject the results. Many factors need to be considered, such as the subjects, the instrumentation and the time element. According to Telzrow (1981) a right-hemispheric learning style was found more among boys than girls. I, the researcher, found this to be true. In the Experimental Group there were only eight boys in the class and six of them had dominant right-brain tendencies. The Control Group had more boys also, but due to transfers the girls who had some right-brained tendencies were used, but the dominance was not as strong as the boys that had been chosen. This is a very important factor in the outcome of this study.

Epstein (cited in Cramer) discovered that the brain grows in spurts and not continuously. He stated that age ten to twelve was one of the growth periods. These students were in that age range, and their intellectual capability should have increased during some of the eight week time period. It is possible that the testing
instrument was not able to discriminate to a large degree an increase in achievement.

I would like to point out that the students exemplified excitement and surprise to have learning activities using the environment as the classroom (Staley, 1980). Greater understanding of concepts were found to be prevalent during these outdoor activities.

The amount of time the other researchers have given to this issue should be considered. I feel that when given the appropriate time span a researcher could carry out a study of this magnitude with a greater degree of success. I also feel that the individuals involved should not be aware of what is happening to reduce what is known as the Hawthorne effect.

Recommendations

1. The researcher should have a curriculum geared to right-brain instruction.

2. The length of time for the study should be increased (six months to a year).

3. More educators should utilize the more right-brained activities in an attempt to carry out similar studies.
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APPENDIX A

Some examples of activities used are as follows:

Character Presentations

Character presentations cause students to analyze research material to discover the character of the person they will play. The students then must synthesize the material into a characterization. Further, the students integrate their learning into a presentation which they perform.

A Three-Dimensional Report

In an effort to use and integrate the thought processes of both hemispheres of the brain, the students communicated their evaluation of a book in a nonwritten format.

Create a Photo Essay

Photography is an activity that students as well as adults enjoy. Photographic creativity and essay writing caused the students to create their own short stories and books.

Multidisciplinary Activities

Many brainteasers, puzzles and games that can be used in the classroom, provided fun as well as a method for using various modes of thought in problem-solving situations.
Outdoor Activities

The outdoor activities were suggested by Staley (1980).