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The effectiveness of using brain based strategies in classroom instruction to enhance student learning

Stacey Agin
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THE EFFECTIVENESS OF USING BRAIN BASED STRATEGIES IN CLASSROOM INSTRUCTION TO ENHANCE STUDENT LEARNING

by
Stacey Agin

A THESIS

Submitted in partial fulfillment of the requirements of the
Master of Arts Degree
of
The Graduate School
at
Rowan University
2001

Approved by ____________________
Instructor

Date Approved April 30, 2001

ABSTRACT

Agin, Stacey P.

The Effectiveness of Using Brain Based Strategies in Classroom Instruction to Enhance Student Learning 2001
Thesis Advisor: Dr. Stanley Urban
Master of Arts in Learning Disabilities

The purpose of this study was to evaluate the effectiveness of using Brain-Based strategies to teach science content. Data was gathered over a ten-week period, which encompassed the entire third marking period. The results were found using primarily the student's test scores. The scores were presented in two categories: whole class averages as well as the special education student's averages.

The subjects of this study include forty-six fifth grade students, ranging in ages from 10-11. Twenty-one are enrolled in the researcher's homeroom class, and twenty-one in a comparable fifth grade class in the same school. The researcher is the science teacher for both classes. Included in each class are five special education students. The classes are entirely Caucasian with the exception of one African American girl.

Results of this study showed that the class receiving a brain-based type of instruction scored higher on the content portion of the tests than the class receiving a direct instruction method. On the contrary, the class receiving the direct instruction method scored higher on the vocabulary part of their tests. Even though there were numerous variables that influenced these results, it was consistent throughout the entire trial period. The special education student's scores were looked at as well in a separate table. The special education students receiving brain-

based instruction scored consistently higher on both the content and vocabulary portions of the test. Many of the variables present could have influenced these scores as well.

MINI-ABSTRACT

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CHAPTER I: INTRODUCTION

Introduction

Why should students get out of their seats during learning? Should students be allowed to get frequent drinks while in school? Is it O.K. for students to be working in small groups, sometimes engaging in loud student directed conversations? Advocates for "brain based" instruction have addressed each one of these questions. The concept of "brain based" instruction has been used for many years and is still being researched today.

Understanding how the brain processes information continues to elude our full understanding. As teachers, we are not taught to match learners characteristics and learning styles with the subject matter or our method of presentation. We are taught to get the information across to the students however we feel necessary. By examining theories of instruction utilizing brain based learning theories, we may find improved methods of instructing each individual child. We need to more fully understand how the brain processes information and what strategies will allow this information to be more easily retained.

As discussed in more detail later, many theorists have been exploring the concepts associated with "brain based" instruction. Eric Jensen has written extensively explaining his theories. Anne Westwater and Pat Wolfe have contributed their ideas about "connecting information" to this approach to instruction as well. Pierce J. Howard has also contributed some wonderful ideas and practical strategies for use in the classroom. There are even some theorists like Bloom, for example, whose contributions date back to the 1500's. Bloom developed a classification system that is still used today.

Theory

"Brain based" strategies are instructional methods for use during classroom instruction. What makes this technique unique and different from traditional direct instruction learning, is how the lessons are implemented. During "brain based" instruction, much effort is placed on teaching so the information can be linked to previous knowledge or experiences. This approach utilizes the concept that information which is not made relevant becomes lost or discarded by the brain's automatic "weeding out" process. The brain does not see this information as being important, therefore discarding it. By implementing these strategies, children should be able to retain more of the learned information.

When people discuss IQ, they are usually referring to how smart a person is. Three well-known psychologists, Sternberg, Gardner, and Eysenck have each formulated their own unique definition of intelligence. "Sternberg defines intelligence as the capacity for mental self-management" (Howard, 1994). He feels intelligence is composed of more than just number, word, and space problems, which constitute traditional tests. Gardner has developed a content definition of intelligence and believes that different types of intelligence are present within a person. An individual may possess different degrees of ability within each of these intelligences (Howard, 1994). Hans Eysench takes a different approach to intelligence. He believes in measuring intelligence by reaction time, inspection time, and age evoked potential. He feels that people who have higher IQ's take a much shorter amount of time to react to a complex stimuli (Howard, 1994).

Purpose of the Study

The purpose of this study is to measure differences in the achievement levels of children who receive science instruction using brain based strategies compared to traditional instruction.

Need for Study

Not all students learn the same. Some relate better to the arts, others to physical activity, and yet some students are auditory learners while others are visual learners. Above all, every student responds well to movement or activity. The goal of this study is to inform educators about the importance of examining teaching approaches, and adjusting to meet the needs of all your students. The literature related to the development of brain-based instruction is not commonly taught to teachers. This project will allow educators to take a step back and recreate the fun and educational learning environment they once thrived on.

Research Questions

1. Will using brain-based strategies, as explicated by Jensen and other theorists, result in greater retention of the content of science lessons than a traditional method of instruction?
2. Will the scores of the special education students included in the class increase in the same proportion as the regular education students?
3. Is one brain-based strategy more effective than others are? Which ones worked the best?

Definitions of Terms

The following list of definitions is derived from the literature in the area of brain-based learning. When necessary, a term may have a specialized definition:

Intelligence -

Gardner - An individual's ability to use a skill, create products, or solve problems in a way that is valued by the society of that individual (HBL, p.47).

Sternberg – The ability to know your own strengths and weaknesses and to capitalize on the strengths while compensating for the weaknesses (HBL, p.47).

Brain Based Instruction - A learning theory based on the structure and function of the brain. As long as the brain is not prohibited from fulfilling its normal processes, learning will occur (On Purpose Associates, 2001).

Direct Instruction - A teaching method that involves a systematic approach that includes well sequenced, highly focused lessons that are presented in fast-paced manner (Gersten, Woodward, & Darsch, 1987).

Limitations

There are several limitations that are apparent in the creation of this project. The most severe is the length of time available for implementing these brain-based strategies. The amount of time to evaluate these strategies is less than four months, which results in a limited treatment period. The second variable is the two classes being used for this study. Each class is made up of 23 different students. The *Otis Lennon IQ Test* will provide a measure of the average intelligence of the two classes, but nonetheless, they *are* two different classes. Interest in the content area introduces another variable. Some students may be more interested in one chapter than another, which would skew the results. Another variable is the inclusion of some students with special needs. Each of the classes has four special education students included in the class. Lastly, in one of the classes, there is an in class support special education teacher present. This could skew the scores since their class work and tests are modified. An awareness of these variables will limit the generalizability of the findings.

CHAPTER II: REVIEW OF THE LITERATURE

Biology of the Brain

The human brain is about the size of a small grapefruit, weighing a slightly over three pounds. It is considered the control center of our bodies, which is responsible for helping to carry out our daily functions. The brain can be divided into three main functional parts: the cerebrum, the cerebellum, and the brain stem.

The cerebrum is the largest of the three areas. It is a soft, gray, wrinkled, jellylike mass representing over 80 percent of the brain's weight. There is one large fissure that separates the cerebrum into two hemispheres. The nerves from the left hemisphere cross over into the right hemisphere and visa versa through the Corpus Callosum. This is the "bridge" that allows the two hemispheres to communicate with each other. Thinking, memory, speech, and muscular movement are some of the important functions that take place in the cerebrum.

At the base of the cerebrum is the hippocampus. The function of the hippocampus is to change the information in the working memory to long-term storage. This process may take weeks (Sousa, 1995). When this area is damaged, a person might meet someone today, and have no idea who they are tomorrow. The hippocampus is very important in relating new information to stored information so a connection with past experiences can be made.

Another important part in the cerebrum is the amygdala. This is the emotional part of the brain. Due to its proximity to the hippocampus, researchers believe that the amygdala encodes an emotional message, if one is present, when learning is transferred from working memory to long-term storage (Sousa, 1995). This allows the emotional message to be recalled each time the memory is recalled. Therefore, when someone is recalling an emotional experience, they are likely to experience the same emotions again.

The cerebellum is the little ball shaped area that sits at the back of the brain and controls functions such as balance. The cerebellum does not initiate any function, but rather reacts to nerve impulses in the muscles. A person who has damaged their cerebellum cannot coordinate movements, tie a shoelace, catch a ball, or complete a handshake.

The third main division of the brain is the brain stem. This brain stem is the oldest and deepest part of the brain, evolving 500 million years ago (Sousa, 1995). This is the area of the brain responsible for sensory reception and the monitoring and controlling of such things as the heartbeat, respiration, body temperature, and digestion.

The brain is composed of a trillion cells of at least two known types, nerve cells and glial cells (Sousa, 1995). The nerve cells are called neurons and the glial cells (glial means glue) hold the neurons together and filter out harmful substances. Neurons are the functioning core of the brain and the entire nervous system. They do not directly connect with each other, but instead through tiny gaps called synapses. The amount of connections made between neurons in an adult's brain in comparison to a child's brain is substantially less. The richer the environment, the more connections are made. As a child approaches puberty, the quantity of connections starts to slow down and a new process starts. This process is where the brain makes useful connections permanent, and rids not so useful connections. Ages two through eleven are when this process is most active. The brain is selectively shaping connections based on prior experiences to prepare for future experiences.

Theorists and their Contributions

Many theorists have been studying the concept of "brain-compatible learning" for decades. Eric Jensen is one of those theorists who state he first discovered this learning style in the early 1980's. He first heard about "brain-compatible learning" during a business development workshop lead by Marshall Thurber. After attending this program, Jensen decided to share his excitement with others so those students in education could benefit from this type of learning experience. His first project was to help co-found a program in San Diego, California, called SuperCamp. This was a ten-day camp with hopes to empower teenagers with life skills and learning tools (Jensen, 1998). This program was such a huge success, it was then offered in other states and countries. Since that time, Jensen has completed much research in the area of "brain-compatible learning" and offers many suggestions and strategies for classroom practices.

Two other researchers, Anne Westwater and Pat Wolfe, also agree on the connection theory. They feel that the information being taught should be relevant to the child's knowledge bank. They too, discuss the way the brain decides to keep or discard information presented. As information is presented, the brain tries to link it with something already known, to give it meaning. If it finds something familiar, it will save the new information. If the brain cannot relate it to prior knowledge, it is more likely to discard the new information as irrelevant. Westwater and Wolfe agree that linking new information to previously stored information accomplishes two things. First, the students will see that they are already familiar with the presented information and may not be as apprehensive. Second, the personalization of the new topic lends meaning or relevance to the information, which makes it more interesting. Interesting information is more readily learned (Westwater and Wolfe, 2000).

Pierce J. Howard, Ph.D. wrote the book, The Owner's Manual for the Brain (1994), to help make a connection between the theorist approach to brain research and the practical application side of brain research. In his book, Howard focuses on how the brain functions, and then provides useful strategies to help individuals utilize these strategies. He too agrees with the previous findings of the importance of relevance linked to the retention of learned information.

In the 1500's, Benjamin Bloom developed a system of classification to identify the six levels of complexity in human thought (Sousa, 1995). This became known as Bloom's Taxonomy of the cognitive domain. The levels of the system, from least to most complex, are knowledge, comprehension, application, analysis, synthesis, and evaluation. Although there are specific levels, it is not a rigid model.

The knowledge section is the rote recall of previously learned material. It is the lowest level of thinking because all it consists of is retelling the same information as it was taught. There is no insight into whether or not the child truly understands the information or is just repeating it. The next level is comprehension. During this stage, the learner must be able to show understanding of the information presented by using it in another way. Application is the next level. This is where the learner uses the material in a new way with minimal help. During the analysis stage, the child should be able to take apart the material and understand the key components. This process uses metacognition, thinking about thinking. Once the child reaches the synthesis stage, he or she should be able to put all the pieces back together again in a new way to them. At this time, the learner is using creativity to discover something new for them. Finally, the last step is evaluation. Now the learner must judge the value of their material based on certain criteria (Sousa, 1995).

Bloom's Taxonomy is a cumulative model. The learner must have the capability to accurately complete each step before passing to the next level. Each skill builds upon the previous one.

Brain Compatible Strategies

One aspect of the literature surrounding brain-based instruction that has been extensively discussed is the recommendation for useful instructional strategies. Throughout the literature, each author has suggested numerous strategies for improving classroom instruction. Some of these ideas include incorporating movement into lessons, providing frequent breaks, activating both hemispheres, using graphic organizers, and many more.

Research shows that movement is a necessity for students in the classroom. Movement increases your heart rate and circulation, which has often been linked to an increase in performance (Tomporowski & Ellis, 1986). Stretching is another important movement when students have been seated in a fixed position for a long time. It increases the cerebrospinal fluid flow to many important areas and allows a greater amount of oxygen to reach the brain area. Another suggestion is to give the students freedom to move to a new place in the room during the lesson. It is suggested that movement gives the child a new spatial reference on the room. They might link the information taught to a new space in the room, therefore, retaining the information better. More locations provide more unique learning addresses. The room doesn't have to be new, just your position in the room (Rizzolatti, Fadigga, Fogassi, & Gallese, 1997).

It has been discovered that the brain needs time to stop and retain information just taught. Movement allows the time for that break. Providing short breaks for the children to stand up, get a drink, stretch, is not only helping to obtain more oxygen, but also allows that down time for retention. According to Cranz (1998), sitting in any chair for more than a short (10-minute) interval is likely to have negative effects on your physical health, as well as your mental self, and at a minimum, reduce your awareness of physical and emotional sensations. "The data suggests that exercise is the best overall mood regulator" (Thayer, 1996, p. 129).

As discussed earlier in this chapter, the brain is made up of two hemispheres, the left hemisphere and the right hemisphere. The left side is responsible for speech, analysis, time, and sequence, as well as recognizing words, letters, and numbers. The right side processes the ideas related to creativity, patterns, spatial relations, and context. It also recognizes faces, places, and objects. In a normal functioning brain, the information is processed and passes to the other side of the brain through the corpus callosum. The two hemispheres compliment each other, using both sides evenly.

Research has shown, however, that most people have a dominant hemisphere. This dominance affects personality, abilities, and learning style. Those who are more left-hemisphere dominant tend to be more verbal, analytical, and good problem solvers. A person who is right-hemisphere dominant usually paints and draws well, does well in math, and relates to the visual world more than the verbal world. To help the students who vary in their left or right hemisphere dominance, teachers can teach to both hemispheres. When teaching a new concept, it would benefit all children if the concept were introduced both verbally and visually. In a summary done by Key (1991) who collected numerous strategies, it was suggested that the talkers be distributed around the room. Key feels these students will spark up discussions more readily. Displaying information on bulletin boards in an easily understood manner, and making clean erasures on the chalkboard were other mentioned strategies. This strategy prevents the visual learner from taking previously written information and confusing it with new information. It might also be helpful to reward students who set goals for themselves and stick to them. Key also suggests letting students read, write, and compute often to enhance meaning.

Another strategy, which stems from teaching to both hemispheres, is the use of graphic organizers. Graphic organizers allow the students to visually place information on a chart to help organize the information clearly. Some different types of graphic organizers are spider maps, hierarchy maps, chain maps, story maps, analogy maps, and K-W-L maps (what the students already *k*now, *w*ants to know, and *l*earned after the lesson). Each one of these maps will organize the information in a different way depending on the child's preference.

Spider maps tend to be used to illustrate classification, similarity, and difference relationships. Hierarchy maps show how a relationship progresses, equivalence, and quantity relationships. Chain maps illustrate time sequence, casual, and enabling relationships. A story map is useful for classifying main ideas with supporting details and events from a story. An analogy map is helpful in illustrating similarities and differences between new and familiar concepts. K-W-L maps illustrate what the child already knows about the information, what they want to know, and the last column illustrates the degree to which the information has been learned by listing those items now learned.

CHAPTER III: DESIGN OF THE STUDY

This study is designed to measure the retention of the content of science lessons after using "brain based" strategies in instruction. Test scores, class work, homework, and classroom discussions will measure the effectiveness of this project.

Method of Sample Selection

The children selected for this study are enrolled in two fifth-grade classes in a middle class suburban school district. The author of this study is the homeroom teacher for one of these classes and a colleague is the teacher for the second fifth-grade class. Therefore, the subjects should be regarded as a convenience sample because its members were chosen for their proximity to the researcher.

Sample

The subjects of this study include forty-two fifth grade students, ranging in ages from 10-11. Twenty-one of whom are enrolled in the researcher's homeroom class, and twenty-one in a comparable fifth grade class in the same school. The researcher is the science teacher for both classes. Included in each class are five special education children. Both classes receive in-class support during the science class. The classes are entirely Caucasian, with the exception of one African American girl.

Treatment Procedure

The researcher's class was chosen to be the experimental group while the comparable fifth grade was designed as the control group and received traditional information. In order for this study to be implemented, there needed to be careful planning. To decide if these strategies would be effective, I decided to implement "brain-based" strategies in one of the science classes, which was considered the treatment group, and not in the other. At the end of this project, I will be looking to see which of the two classes has the higher test average.

Throughout the time period of this study I have been, and will continue to, implement different strategies within the two classes. My science class received instruction using movement, cooperative learning, graphic organizers, games, music, and the ability to take frequent breaks. This class is considered to be the treatment group. Depending on the particular lesson, the students were asked to take a break after 20-25 minutes of instruction. During the cooperative learning lessons the children worked in small groups to answer questions from the chapter. We used graphic organizers to map out important information that was difficult to understand. This method appealed to the visual learner. Certain games were used to enhance memory of the information as well. The students played "Test Jeopardy" as a review of terms from the chapter. At times the students had to create a song that would help the rest of the class remember the definitions to the vocabulary words. Ms. Cutrupi's science class (the control group) learned the information through the direct instruction method. We read the chapters together in class and answered questions to accompany the information. We are hypothesizing that the group of students who were taught using the brain-based strategies will retain a greater amount of information than the control group.

Studies have shown the effect of "brain-based" instruction being beneficial to the students. To try to implement these strategies, we played matching games, made flash cards, worked in groups to help share ideas and experiments, moved around our seats to give new spatial dynamics to the lesson, and wrote songs to help the students link the new information to lyrics they already knew.

Collection of Data

Student's test scores on end of chapter tests will be used to measure acquisition of knowledge. After a chapter is taught, a vocabulary and chapter test is given to each group. Each group takes the same book-designed test, made up of 20 multiple-choice questions. The special education students have the opportunity to leave with the resource room teacher to take the test in her room. She is there to answer any questions the students have, without disrupting the rest of the students. All the students have the same amount of time to take the tests, approximately forty minutes. I will take the average of the scores for each class and compare them. There will be four or five opportunities to gather this data.

The second way to collect this data is class work and homework. Each night the students from each class have the same homework assignment. Judging by their answers, I can gather if the children truly understand the concepts. Classroom discussion and assignments can also be used as another way to see how much information they are retaining. Throughout the learning of new information, and as a review, questions are asked about the content. The student's responses are a good assessment tool for the retention of the information. At times, the students are required to do in-class assignments and/or projects. During this time I am able to check for comprehension and make sure that the students did not get any assistance from their parents at home. During this time they are required to do the entire assignment in the classroom setting.

Research Design and Analysis of Data

In order to answer the research questions posed in this study, the following design and method of data analysis were used. First, this study utilized a quasi-experimental design in that the experimental and control groups were assigned by non-random measures and posttests were administered to each group. Percent of gain in each group will be presented for the treatment group and the traditional instruction (control) group. Judgement will be made to determine if meaningful differences existed between the groups.

CHAPTER IV: ANALYSIS AND INTERPRETATION OF DATA

The purpose of this study was to evaluate the effectiveness of using Brain Based strategies in classroom instruction to enhance student learning. These strategies were implemented in a fifth grade science class. The effectiveness was measured by comparing the test scores of the students who received Brain Based instruction strategies to the students taught using a traditional direct instruction method.

Results

The data obtained was used to answer the following research questions:

1. Will using brain-based strategies, as explicated by Jensen and other theorists, result in greater retention of the content of science lessons than a traditional method of instruction?
2. Will the scores of the special education students included in the class increase in the same proportion as the regular education students?
3. Is one brain-based strategy more effective than others are? Which ones worked the best?

In order to answer the questions posed earlier, the results will be displayed in a table format.

1. Will using brain-based strategies, as explicated by Jensen and other theorists, result in greater retention of the content of science lessons than a traditional method of instruction?

The data for this thesis project was gathered during the third marking period of the 2000-2001 school year. Half of the students involved in this project were taught the science material using a traditional method, while the other half were instructed with the use of brain-based strategies. After each chapter was taught, the students were administered a vocabulary test as well as a content test. Two chapters were completed during this recent marking period. The results are listed in the table below.

Table A

Third Marking Period Science Test Averages

Chapter	Content Test		Vocabulary Test	
	Brain Based Instruction (N=21)	Direct Instruction (N=21)	Brain Based Instruction (N=21)	Direct Instruction (N=21)
Chapter 9	**77%**	73%	91%	**95%**
Chapter 5	**79%**	74%	81%	**89%**
Chapter 2	**90%**	86%	94%	**95%**

After each chapter, a vocabulary and content test was administered. The scores of each class was averaged and analyzed. Table A shows that the class that received brain-based instruction earned a higher score on the content test for all three chapters. The opposite relationship occurred when given the vocabulary test. Each time the class that received the brain-based instruction scored lower than the class that received direct instruction.

To answer the question, the brain-based strategies seemed to be effective in the retention of the content of the science material, but the same relationship was not found for the retention of the vocabulary. Variables and possible suggestions for why these results were found will be discussed in Chapter 5.

2. Will the scores of the special education students included in the class increase in the same proportion as the regular education students?

As stated earlier, each of the two classes being studied had five special education students. These students were primarily in the regular education class, but received in-class support in science. They were taken out of the classroom during tests and had the tests read to them when necessary. The special education teacher may have given clues to prompt the students when needed. Table B shows how the scores in these classes were related.

Table B

Third Marking Period Science Test Averages (Sp.Ed.)

Chapter	Content Test		Vocabulary Test	
	Brain Based (Sp.Ed.) (N=5)	Direct Inst. (Sp.Ed.) (N=5)	Brain Based (Sp.Ed.) (N=5)	Direct Inst. (Sp.Ed.) (N=5)
Chapter 9	**68%**	53%	**93%**	82%
Chapter 5	**71%**	63%	**77%**	75%
Chapter 2	**83%**	72%	**94%**	85%

As shown above, the special education students who received instruction using the brain-based strategies scored higher on both the content and vocabulary tests than the students who received only direct instruction. A discussion regarding these scores will be presented in Chapter 5.

3. Is one brain-based strategy more effective than others are? Which ones worked the best?

Throughout this trial period there were many brain-based strategies used. These included such strategies as movement, cooperative learning, graphic organizers, flash cards, games, music, and providing frequent breaks. It seems some of these strategies may have worked better than others.

The student's in the brain-based class made flashcards to help learn the vocabulary for each chapter. Unfortunately, the scores show that class to have the lower vocabulary scores. Even though the scores were lower, it was positive to see that the average scores overall were between 80 – 95 percent.

Another strategy used to enhance comprehension and retention of the science content was to play games. The student's played the "Test Jeopardy" game to review for the chapter 5 test. This proved to be a strategy that might have caused the control class to obtain the higher scores on average.

When taught the chapter 9 content, the student's organized the key points from the chapter into graphic organizers. The purpose of this strategy is to have the student's focus on the important information and see it placed in an organized flow chart or diagram to help picture it when needed to retrieve it. The students should understand the relationships between certain concepts. This strategy too proved to be effective. The students receiving this strategy scored higher on the chapter 9 test then the other class.

The students used a wide range of activities to learn chapter 2. The students read the chapter aloud in class and answered specific questions about what they had just read. Then they had to outline the chapter by copying a prewritten outline off the overhead. The students then had to respond to questions on a worksheet about each lesson in the chapter. Lastly, the student's completed a hands on project where they had to create an object from the chapter out of household materials. Due to the higher scores on this test in relation to the other two tests, these strategies, or combination of activities, seemed to be effective.

Very often more than one strategy was used for a chapter. This made it harder to tell if one strategy in isolation was more effective than another. It seemed that natural teaching styles lend themselves to using many of these strategies.

CHAPTER V: SUMMARY, FINDINGS, AND CONCLUSIONS

Summary

The purpose of this study was to evaluate the effectiveness of using Brain-Based strategies to teach science content. Data was gathered over a ten-week period, which encompassed the entire third marking period. The results were found using primarily the student's test scores. The scores were presented in two categories: whole class averages as well as the special education student's averages.

The subjects of this study include forty-six fifth grade students, ranging in ages from 10-11. Twenty-one of whom are enrolled in the researcher's homeroom class, and twenty-one in a comparable fifth grade class in the same school. The researcher is the science teacher for both classes. Included in each class are five special education students. The classes are entirely Caucasian with the exception of one African American girl.

Results of this study showed that the class receiving a brain-based type of instruction scored higher on the content portion of the tests than the class receiving a direct instruction method. On the contrary, the class receiving the direct instruction method scored higher on the vocabulary part of their tests. Even though there were numerous variables that influenced these results, it was consistent throughout the entire trial period.

The special education student's scores were looked at as well in a separate table. The special education students receiving brain-based instruction scored consistently higher on both the content and vocabulary portions of the test. Many of the variables present could have influenced these scores as well.

Findings

Results show that by studying the test scores of the students in this study, it seems that using some form of Brain-Based instruction to teach content is effective. The class that received this special kind of instruction scored consistently higher on the content test than the class receiving direct instruction. On the contrary, the class that received direct instruction scored consistently higher than the Brain-Based group on the vocabulary tests. The implications for this will be discussed shortly. The special education population was studied as well. The results show that the special education students who received Brain-Based instruction averaged higher scores on the content and vocabulary tests for all three chapters. This seems to be an effective teaching strategy for this population of students.

Implications

It would be beneficial if the results from a study could prove the effectiveness of using a particular strategy, but this is rarely the case. As with any study or research project, there are numerous variables that lead to the tentativeness when generalizing the results.

In this research project there were many variables that caused the data collected to have inaccuracies. One of the variables that may have influenced the results is the student's ability levels. Even though the classes had a similar composition in terms of IQ scores based on the ***Otis Lennon Standardized Achievement Test*** administered in October of 2000, there is still a difference in the intelligence/potential levels of these two classes. This could skew the results of this study. It does not necessarily matter what strategies are used to teach the information; one class might be predisposed to better achievement.

Another variable with the potential of confounding the results of this study is the student's interest in the science content. It is obvious that some of the students might have more interest in one of the chapters and less in another. There is no way of determining if the students benefited from the type of instruction, or just had more interest in the material.

When I averaged the test scores for the two classes, the special education population was included. One inconsistency that influences the results is the presence of in class support. The class averages in the class receiving direct instruction were made up of regular education students and special education students with no in class support. The class receiving Brain-Based instruction was made up of regular and special education students as well, but did have an in-class support teacher who helps the students. This could cause the scores in this class to be higher than the scores in the other class. The special education students are given extra time, questions are read aloud, and prompts might be given. This evidence can be observed by the results in Table B. This data table shows that the special education class that received Brain-Based strategies, which is also the class with in-class support had higher scores in every area. There might be a wide variety of reasons for the higher scores but this could certainly be one cause. Not only might this have caused higher scores in the special education population, but possibly the regular education students as well. The resource room teacher helps all the students in the class, not only her assigned five students. She might have influenced how well all the students have done.

To learn the vocabulary words from each chapter, the students had to write the words and definitions on index cards. These cards stayed with them at all times. The student's had some opportunity to practice with them in class, the rest of the time they were to be studying them at home. There was not really any direct instruction used when the students were learning these words. This too might contribute to the inconsistency of the test scores. It can't be said that the Brain-Based method doesn't work, because it was not used. The strategy of using index cards was introduced to them, but they were completely on their own to learn the words and study for the tests.

Finally, one last variable that might have influenced the test scores is teaching style. The class that receives Brain-Based strategies is the homeroom class of the instructor. The class receiving direct instruction is a colleague's class. There is the idea that the Brain-Based class received higher scores because they are familiar with the learning style of the teacher. The other class only has that teacher for only one period and therefore is not as familiar with that teacher's teaching style. This might have an effect on the grades.

Overall, I feel that this type of instruction has been beneficial to most students. The data shows that the student's who received this type of instruction did have an increase in their content scores, which is what this study was trying to demonstrate. These strategies were not difficult to implement and the results were worthwhile.

Bibliography

D'Arcangelo, M. (2000). How does the brain develop? Educational Leadership, 58(3), 68-71.

Howard, P.J. (1994). The owner's manual for the brain: Everyday applications from mind-brained research. Austin, TX: Leornian Press.

Jensen, E. (1997). Brain Compatible Strategies: Hundreds of easy-to-use brain-compatible activities that boost attention, motivation, learning and achievement. Del Mar, CA: Turning Point Publishing.

Jensen, E. (1998). Teaching with the brain in mind. Alexandria, VA: Association for Supervision and Curriculum Development.

Mercer, C., & Mercer, A. (2001). Teaching students with learning problems. Upper Saddle River, NJ: Prentice-Hall Inc.

Meyen, E.L., & Vergason, G.A., & Whelan, R.J. (1996). Strategies for teaching exceptional children in inclusive settings. Denver, CO: Love Publishing Company.

On Purpose Associates. (1998-2001). Brain based learning. [On Line]. Available: http://www.funderstanding.com/brain_based_learning.cfm.

Polloway, E.A., & Patton, J.R., & Serna, L. (2001). Strategies for teaching learners with special needs. Upper Saddle River, NJ: Prentice-Hall Inc.

Sousa, D.A. (1995). How the brain learns. Reston, VA: National Association of Secondary School Principals.

Sousa, D.A. (1998). Learning manual for how the brain learns. Thousand Oaks, CA: Corwin Press Inc.

Sternberg, R.J., & Grigorenko, E.L. (2000). Teaching for successful intelligence: To increase student learning and achievement. Arlington Heights, IL: Skylight Training and Publishing Inc.

Sylwester, R. (2000). A biological brain in a cultural classroom: Applying biological research to classroom management. Thousand Oaks, CA: Corwin Press Inc.