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Study Regarding the Effects of Brain Gym on Student Learning

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Study Regarding the Effects of Brain Gym on Student Learning

by

Karen L. Gibbs

May 2007

**This thesis submitted to the
Department of Education and Human Development of the
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Study Regarding the Effects of Brain Gym on Student Learning

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Table of Contents

Chapter I: Introduction.....	1
Statement of the Problem.....	3
Significance.....	3
Rationale.....	4
Chapter II: Literature Review	6
The Brain and Brain Function	6
The Brain and Learning.....	8
Learning Style Research Studies.....	9
Brain Gym.....	14
Brain Gym Research Studies.....	19
Chapter III: Applications and Evaluation.....	26
Introduction.....	26
Participants.....	26
Procedures of Study.....	29
Instruments for Study.....	31
Chapter IV: Results.....	34
Results from Anecdotal Records.....	34
Results from Surveys.....	37
Results from Interviews.....	49
Student Observations.....	51
Results of Academics	54
Chapter V: Conclusions and Recommendations.....	57
Impact on Motivation.....	57
Impact on Attention.....	58
Impact on Academics.....	58
Challenges Throughout the Study.....	59
Recommendations.....	60
References.....	62
Appendices.....	65
Appendix A: Parent Consent Letter.....	65
Appendix B: Parent Consent Form.....	66
Appendix C: Child Consent Letter.....	67
Appendix D: Student Survey 1.....	68
Appendix E: Student Survey 2.....	69
Appendix F: Student Interview 1.....	70
Appendix G: Student Interview 2.....	71
Appendix H: Observation Form.....	72
Appendix I: Principal Consent Letter.....	73
Appendix J: IRB Approval.....	74

List of Tables

Table 1: Results from Survey #1.....	38
Table 2: Results from Survey #2.....	39
Table 3: Pre-Post Study Comparison of Jen’s Responses for Positive Statements	41
Table 4: Pre-Post Study Comparison of Jen’s Responses for Negative Statements	43
Table 5: Pre-Post Study Comparison of Murphy’s Responses for Positive Statements	44
Table 6: Pre-Post Study Comparison of Murphy’s Responses for Negative Statements	45
Table 7: Pre-Post Study Comparison of Mike’s Responses for Positive Statements	46
Table 8: Pre-Post Study Comparison of Mike’s Responses for Negative Statements	47
Table 9: Pre-Post Study Comparison of Abby’s Responses for Positive Statements	48
Table 10: Pre-Post Study Comparison of Abby’s Responses for Negative Statements	49

Chapter I

Introduction

For many years, teachers have been looking for ways to maximize student attention, interest in learning and motivation to succeed. Teachers have tried a variety of strategies to attain this goal. One way some teachers have attempted to do this is to incorporate movement into their classrooms. There are many reasons why physical movement can have such a positive impact. Recent research has shown that incorporating physical movement into student learning helps to awaken different parts of the brain. Some advances in science have allowed researchers to better understand the brain, brain function and how movement influences both.

Brain research tells us that the brain is composed of two hemispheres. These two hemispheres include the right hemisphere, which sends information to the left hemisphere, and the left hemisphere, which sends information to the right hemisphere. The constant sharing of information is made possible by nerve cells and fibers that make up the nervous system (Templeton & Jenson, 1996). Templeton and Jenson also found that typical teaching strategies tend to over rely on left-sided techniques and activities (1996). With teaching strategies that focus on the left-side of the brain, one may wonder how we are reaching students whose learning style favors the right side of the brain.

Teachers need to take into consideration that the brain has parallel processes. While one side of the brain is used for more creative thinking and artistic expression, the other is more analytical and logical. Although these processes occur in different

parts of the brain, when students learn, they need to be able to access and use both processes simultaneously. The needs of each student are very different and knowledge of how they learn is crucial to developing activities and lessons that will allow them to attain knowledge. In order to meet the needs of all learners, teachers need to use a plethora of methodologies. By incorporating a variety of methods, the brain is able to find patterns in seemingly random information. This helps to make information more logical and meaningful (Reardon, 1999). One method that has been strongly tied to increasing student learning is incorporating movement into educational practices.

Jean Blaydes, a neurokinesiologist, completed research to show that movement and learning are largely connected. Through her research, she has found that not only is memory retrieved better when the information is learned through movement, but that physical activity increases a certain protein that strengthens memory retention (2001). Neurophysiologist and educator, Carla Hannaford, found that, incorporating movement into her classroom had a significant impact on her students. She began using short mind-body exercises at the beginning of each day. Within a few weeks she began to notice some positive changes. She even stated that her students "...became more attentive and their grades improved" (as found in Hannaford, 1996, p. 67).

The knowledge of brain function and connection to movement has been known for some time. As early as 1969, Paul Dennison began looking for ways to help children and adults who were labeled as learning disabled. As his research

commenced, he began to study kinesiology, “the science of body movement and its relationship to brain function” (as found in Kirpichnikova, 2006, para 2). From his studies, Dennison developed a program of physical movements. This program, Brain Gym, consists of a variety of physical movements that claim to help with student learning. If incorporating these targeted movements into a classroom routine can have such a positive impact on student learning, education as we know it, could be improved greatly.

Statement of the Problem

The problem that will drive my research is: How does Brain Gym impact student attention, motivation and achievement? I would like to begin using Brain Gym in my third grade classroom to document its effects and evaluate its possible benefits. The implementation of Brain Gym will involve the students learning a variety of movements as outlined in the Brain Gym manual during transitions between curricular areas. Additionally, I will use Brain Gym movements during different subjects to provide movement and refocusing when the students are required to sit for an extended period of time.

Significance

As a third grade teacher, I am constantly looking for ways to maximize student attention, interest in learning and motivation to succeed. The students in my classroom, as in any classroom, come to me with a variety of interests, learning styles and educational needs. It is challenging and necessary to meet the needs of my

students. As I reflect on my teaching and the students in my classroom, I question if I am allowing enough time for meaningful movement throughout the day. After reading some of the research on the effects of physical movement on learning, I began to wonder if incorporating these movements would help me meet the needs of the diverse group of learners in my classroom.

With the gains scientists have made on brain research, I am curious to see what impact incorporating Brain Gym will have on my students. I am particularly interested in the impact it will have on those students who lack motivation and struggle to pay attention. If Brain Gym can help these students in these areas, I can only imagine the impact it will have on the other students as well. I would like to examine the impact of Brain Gym on student learning. The results of this project will not only influence the way I structure time in my classroom, but also how I view student learning as a process.

Rationale

The purpose of this research will be to study the effects that Brain Gym has on student learning. Different aspects of learning include attention, motivation and achievement. This study is important to me because I believe that the gains we are making in brain research are valuable and should be used in every way possible. Although sitting quietly and paying attention are two behaviors that students need to develop, I also feel that we need to teach students different methods to refocus and incorporate movement into their learning environment. Movement is a physical need and Brain Gym allows teachers to satisfy that need.

I chose to engage in this research because I feel that the benefits of Brain Gym are numerous. Even if there is no impact on academic achievement, allowing students to have meaningful movement throughout the day is worth the time and effort. I was also intrigued by this topic because it is a fairly new issue that has not been as widely researched as others. There are skeptics who believe that Brain Gym has no valid claims, and I would like to investigate to find out for myself.

The following chapter will highlight research done on the brain and brain function. It will also explain Brain Gym and elaborate on some of the results that educators and researchers have had with the program.

Definition of Terms

Educational Kinesiology – the science of body movement and its relationship to brain function

Brain Gym – A program, developed by Paul Dennison, that incorporates specific movements that impact brain function and improve student learning

Chapter II

Brain Gym is still a fairly new program that is based on brain research theories. Many of these theories have stemmed back to the early studies done by Piaget and other pioneers such as Freud and Dewey in the field of development. Through the research concluded by experts, significant information about the brain and brain function has been discovered.

The brain is composed of three main parts, the cerebrum, the cerebellum, and the brain stem. The cerebrum is the largest portion comprising eighty-five percent of the brain. The cerebrum is complex. It consists of two hemispheres (the right and the left) and nerve bundles connecting the hemispheres. In addition to this, the hemispheres are divided into four lobes. Each side of the body sends and receives messages from the opposite hemisphere of the brain. Complex nerve cells and nerve fibers allow this transaction to happen (Templeton & Jenson, 1996). The nerve endings that form the corpus collasum connect the two hemispheres of the brain and transmit signals from one half to the other (Bancroft, 1995).

As researchers have discovered, the two hemispheres of the brain have specialized functions. Bancroft found that although they share some functions, and both hemispheres participate in most activities, they also have separate purposes. The left hemisphere function deals mostly with systematic thinking, analysis and focuses on functions in mathematics and verbal language. It can be described as more linear and sequential. Tasks completed by those who use more of their left hemisphere are often completed in order and in a step by step manner. Those who prefer to use their

left hemisphere tend to solve problems by looking at how the parts make up the whole instead of starting with a whole topic and breaking it down (1995).

The right hemisphere, on the other hand, has different specialized functions. Research has shown that the right hemisphere is better at making connections between patterns found in information. This hemisphere is primarily responsible for visual and spatial processing including knowledge of our body and creative thinking. People who learn though a more right-brained manner tend to look at the whole topic and break it down from that. For instance, they would prefer to look at a lesson and figure out how to come up with the steps to accomplish it, whereas a left-brained person would prefer to have the lesson given to them in pieces following a sequential order (Bancroft, 1995).

Much of what the researchers know about brain function comes from research carried out with participants who have been brain damaged. Some of this brain damage has caused the corpus callosum to be damaged, or, in some cases, surgically detached, severing the connection between the right and left hemispheres. The researchers were able to study each hemisphere in isolation to find the specific functions of each (Bancroft, 1995). Research has also shown that crossing the midline (corpus callosum) is essential for learning. Dennison and Dennison found that “The inability to cross the midline results in such identifications as ‘learning disabled’ or ‘dyslexic’” (1994, p. 1). Furthermore, researchers have also shown that the brain is affected by how frequently it is used. Like a muscle, the functions of both

hemispheres can either strengthen or weaken, depending upon the usage of the hemisphere (Templeton & Jenson, 1996, p. 5).

After reading about hemispheric specialization and the functions of each hemisphere, it became clearer as to why educators need to incorporate more right brained activities into student learning. As previously discussed, the U.S. education system tends to teach from a left-brain perspective (Templeton & Jenson, 1996). Incorporating both hemispheres in learning could have an impact on the education system. As we know, the brain is a very complex organ. Researchers have found that as we experience different events, the stimulation, whether it is physical or not, helps to create neuron growth and that, "...the actual 'wiring' of the brain is affected by school and life experiences. Anything that affects our physiological functioning affects our capacity to learn" (Caine & Caine, 1990, p. 66). Lynley Russek also found movement and learning to be related. He claims that learners need to be creative when they are learning. Part of acquiring knowledge is doing it in a way that is meaningful for the student. Meaningful learning can look very different. Some students prefer to listen to acquire knowledge, while others would prefer hands-on/tactile activities or to read for information (2004).

The importance of understanding the varied processes of the brain and how it differs from student to student should be taken into consideration as educators prepare lessons and teach. Learning is impacted by a number of factors. In addition to frequency of usage, as previously discussed, the brain is also affected by physiological roles like emotions, nutrition, physical health and level of physical

activity. Thoughts, feelings and physiology all impact student learning.

Consequently, all three elements are interrelated and can impact each other. For instance, if a student is upset they may need to take a deep breath. The physical act of breathing slowly can impact the other elements. When these three areas are balanced and in a positive state, student learning is enhanced (Reardon, 1999).

In addition to this, much has been discovered about children's learning style. Howard Gardner's theory of multiple intelligences has been critical in understanding how students learn and developing instruction to suit their needs. Moran, Kornhaber and Gardner explain that multiple intelligences are basically an explanation of how the mind works. Each child has strengths in a number of areas. These strengths can be assessed by using a profile that measures them in the different intelligences which include; linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, naturalistic, interpersonal, intrapersonal, and existential (2006).

As educators, it is important to use this information to enhance the learning of all of our students. As teachers begin to understand the plethora of learning styles and combinations of learning styles, they can tune their instruction to incorporate facets of each. By incorporating different methodologies and experiences, teachers are able to help all students learn, not just the students with similar learning styles.

In multiple studies by Sternberg, Clinkenbeard, Grigorenko and Ferrari (2006), a student's learning style became a priority in evaluating how students gain and retain information. The participants in the different studies were varied. Some populations in Alaska and Kenya were studied based on cultural knowledge, while others in more

typical populations were also examined. The students studied were from a variety of grade levels (four through eight) and were evaluated in a range of academic areas including; math, science, social studies and different aspects of English and language arts.

Students were split into four achievement groups: high analytical, high creative, high practical, high balanced (high in the other three areas), or low balanced (low in all three areas). These four groups were separated and dispersed so that each instructional section contained at least one student from every achievement cluster. Students in these sections were taught with an emphasis in one of four areas including; memory based, analytical, creative or practical instruction. They were evaluated using different tests and a project. In this study the results were clear. Students whose achievement strengths matched their learning style performed better than other students (Sternberg, 2006). This is evidence that students learn best if their education incorporates their learning style and/or strengths.

One learning style that many teachers try to incorporate into instruction is bodily kinesthetic. A method that has been strongly tied to increasing student learning for this type of learner is incorporating movement into educational practices. Physical activity has many benefits. Blaydes found that movement is not only good for the heart, but also the brain. When one moves, oxygen and glucose levels as well as nerve connections increase. All of these benefit the brain, and consequently, student learning (2001). Research has also shown that incorporating the body's senses helps in the acquisition of information. According to Hannaford, "Movement of the body

also serves to integrate and anchor that information into the neural networks that are located throughout our bodies” (1996, p. 68). Memories are often triggered by different smells, sounds and even textures.

As stated earlier, Jean Blaydes, a neurokinesiologist, has done research to show that movement and learning are linked. Through her research, she has found that not only is memory retrieved easier when the information is learned through movement, but that physical activity increases a certain protein that strengthens memory retention (2001).

Blaydes (2001) findings are similar to those found in a study done on the effect of physical education on academic achievement. In this study, a group of researchers set out to find a correlation between physical education and achievement. Interest in this topic has been growing since the percentage of schools requiring physical education is decreasing. In an effort to improve academic achievement and test scores, some schools are replacing physical education classes with other classes; though there has been no clear evidence that such actions are successful (Coe, Pivarnik, Womack, Reeves & Malina, 2006).

To research the correlation between academic achievement and involvement in physical education, Coe, et al. (2006) chose 214 sixth grade students from western Michigan and placed them into two groups. The first group was assigned to take physical education during the first semester, and the other group took it the second semester. Academic achievement was measured from the grades of the four other core courses (math, science, English and world studies) the students were taking,

along with standardized test scores. It was found in both groups that although moderate physical activity did not have a significant effect on achievement, vigorous activity did. According to the Healthy People 2010 guidelines, moderate activity and vigorous activity are measured in metabolic equivalent (MET) values. Moderate activity requires 3.0-5.99 METs while vigorous activity requires greater than 6.0 METs. Students participated in each type of exercise on different days. When students were involved in more vigorous physical activity, they displayed higher grades in their other courses (Coe, et al, 2006). This correlation shows that the intensity of the physical activity is as important as the amount of time spent doing the activities.

The knowledge of brain function and connection to movement has grown. In 1969, Paul Dennison began looking for ways to help children and adults who were labeled as learning disabled. He worked alongside some well-known sensory-motor experts such as Doman and Delacato, Ayres, Tomatis and Kephart, who found that children who are physically developed are able to acquire knowledge easier. Other experts, such as Piaget, Gesell and Montessori also found that children were able to master abstract concepts better if they were presented in a concrete way (as found in Jager, 2001).

As Dennison began to research, his study shifted to kinesiology, which is “the science of body movement and its relationship to brain function” (Kirpichnikova, 2006, para 2). Dennison found that when the brain works laterally (from side to side), bilateral integration is possible (both sides of the brain work together). When this

happens, one crosses the central midline of the body to work in the midfield. The midline of the body is the line that separates one visual field from another. It also parts the two hemispheres, causing them to work separately. Working in the midfield (the area where the two visual fields overlap) allows a person to process and understand codes and written information while using both hemispheres of the brain (1994). By physically moving the body, people are able to work in the midfield. Young children and babies do these movements naturally, developing the neural connections of the brain. As the neural connections are formed, learning occurs (Kirpichnikova, 2006).

Additionally, it has been shown that the physical function of the brain and nervous system has an impact on behavior, abilities and self-image. These three areas can be altered through neurological stimulation. As a person moves, blood circulation increases. As this happens, oxygen moves to cells throughout the entire body. The increased flow of blood and oxygen help to transport messages through the nervous system. The more quickly the message is received by the brain, the more adept the brain is to react adequately and efficiently (Jager, 2001).

In 1995, research was completed on the effect of Educational Kinesiology on students with learning disabilities. Twenty five students were selected to participate in the study. Pre- and posttest scores, both in the areas of academics and perceptual motor skills, were given and used to gather information on student growth. At the end of the investigation, it was noted that although Educational Kinesiology

movements did not have a significant impact on academics, it did significantly improve the students' perceptual motor skills (Cammisa, 1994).

In addition to this, research has shown that the brain learns through patterns. Hart, (1986), a researcher, developed a theory known as his Proster Theory of Human Learning. This theory focused on the fact that the brain searches for patterns. The brain attempts to make connections between previously acquired knowledge and newly introduced information. The connections that are made are known as 'program structures' or 'prosters.' (as found in Templeton & Jenson, 1996). Hart's theory raised some important questions. Templeton and Jenson found that "According to Hart's theory, the most effective learning occurs when the external sensory input challenges the student's brain to either recall and integrate the greatest number of existing programs, expand on an already existing program, or develop new programs" (1996, p. 6). As new information is received, a person makes connections to memories, experiences and prior information. As the brain relates information to previous knowledge, it expands upon and creates new knowledge.

As learners, each person has their own way of thinking. Often, the way one acquires knowledge follows a pattern that the brain has created. At times this pattern can hinder our way of thinking and behavior when acquiring knowledge. Brain Gym, a program developed by Dennison, integrates movements that can change the way your brain collects information to improve function and learning (Jager, 2001). Cross lateral movements strengthen neural connections and help blood flow into both hemispheres of the brain (Blaydes, 2001).

Furthermore, research has shown how stress can impact learning. The brain learns best when it is challenged, but not when a person is stressed. When a person becomes threatened, he or she will revert to automatic behaviors. Instead of thinking through a stressful situation, they resort to the body's natural "fight or flight" reaction (Caine & Caine, 1990). For instance, in some situations, when students are presented with a stressful situation or puzzling problem, they react to the stress in an automatic way by crying and refusing to attempt the work.

Research by Jacobs and Nadel explains that the hippocampus is a part of the limbic system in the brain. The hippocampus functions as a transmitter. As the different parts of the brain send messages, the hippocampus is the area where the messages are received and sent on to other areas. In addition to this, this particular part of the brain is the most sensitive to stress. When under stress, the hippocampus will not function properly and people lose contact with other parts of the brain (Caine & Caine, 1990). It is known that different parts of the brain are constantly communicating with each other. This communication is essential for our body and brain to function. When information cannot flow freely, due to stress, "learning blockages" occur (Cohen & Goldsmith, 2003). Brain Gym makes connections between different neural pathways that allow students to function through stress by working around the blockage. This allows the children to learn (Dennison & Dennison, 1994).

As a result of his research, Dr. Paul Dennison developed an educational program called Brain Gym. Brain Gym is a program of physical movements. This

program is comprised of twenty-six different movements that are said to "...bring about rapid and often dramatic improvements in concentration, memory, reading, writing, organizing, listening, physical coordination, and more" (Kirpichnikova, 2006, p.1).

As explained by Cohen and Goldsmith, Brain Gym implementation goes through a series of phases. The acronym, PACE (Positive, Active, Clear and Energetic) is used to describe how the body prepares for learning. PACE is a series of phases that students complete before they begin learning or any activity that students need, to be at their top performance. Although the acronym is spelled PACE, the teacher's manual explains that the phases actually take place in the opposite order, ECAP. The first phase, "E", standing for "energetic" is the step where students drink water. Water is the most plentiful substance in the body and should be replaced frequently. Although this series of phases begins with water, those who implement Brain Gym recommend that students drink small amounts of water throughout the entire day in order to maintain hydration of the body and brain (2003).

The second movement, "C" stands for "clear". In this step, the students are guided to massage the indentations directly under the collar bone while holding their other hand over their navel. This phase is used to help the students align their brain functions of the left and right side for skills that require them to cross the visual midline. Some activities that this may include are reading and writing (Cohen & Goldsmith, 2003).

The PACE formula continues with “A”, standing for “active”. There are a number of ways to complete this step in the sequence. Some of the more popular movements include the cross crawl. This movement requires students to move their elbow on one side of their body and touch it to their knee on the opposite side. By completing this motion, the brain is stimulated and both the left and the right side of the brain are activated concurrently (Cohen & Goldsmith, 2003).

The final step in the PACE series is “P”, which stands for “positive”. To meet the requirements for this step, students are involved in “hook-ups”. The students cross one ankle over the other and the wrist on the same side over the other wrist. After doing this, the students interlock their fingers and curl their arms into their body. This movement also incorporates placing the tongue against the roof of one’s mouth and breathing slowly. This piece of the PACE formula has a calming effect and relieves stress (Cohen & Goldsmith, 2003).

Brain Gym has also been said to help information transfer in the brain and help the brain to function better, improving learning for those who use it (Cohen & Goldsmith, 2003). Additionally, incorporating body movements has been suggested by Reardon as a way to connect learning and context. It has been shown that the brain organizes information and stores it based on the context in which it happened. By allowing the students to physically move, they are provided with a context to store information and improve their memory of the content (Reardon, 1999).

The movements used in Brain Gym have been adapted from movements that humans go through in developmental stages, even as infants. These specific

movements have been noted as having an impact on brain development (Wolfsont, 2002). Some of the Brain Gym activities have been adapted from other activities used by behavioral optometry to increase brain-body coordination (Dennison & Dennison, 1994).

Brain Gym incorporates Midline Movements. These movements are physical movements that cross the vertical midline of your body. The vertical midline is the line that separates one's right and left visual field and brain hemisphere function. When this happens, one is able to work in the midfield. "The Midline Movements help to integrate binocular vision, binaural hearing and the left and right sides of the brain and body" (Dennison & Dennison, 1994, p. 3). Binocular vision is the ability for both eyes to function together and simultaneously process visual information. Binaural hearing is when the brain processes auditory information simultaneously. Wolfsont writes that when opposite hemispheres are incorporated, performance and ability of the brain improves. He went on to explain that the specific abilities of the brain include communication, organization and comprehension/attention. Each area of the brain is specifically linked to these three abilities. The left-right hemispheres are responsible for communication. The top-bottom area is responsible for organization and the front-back area is in charge of comprehension and attention (2002). One example of a Brain Gym movement is the Cross Crawl. This activity is similar to walking in place. The person doing the activity takes his or her arm and moves it alternately with the opposite leg. There are many variations of this, but all of them mimic the movement that naturally occurs during activities such as crawling,

walking or running. This activity is successful because it stimulates the receptive as well as expressive hemisphere (Dennison & Dennison, 1994).

By crossing the midline, one is also able to center themselves. Centering is defined by Dennison and Dennison as, “The ability to cross the dividing line between emotional content and abstract thought; also, the organization of body reflexes” (1994, p. 44). By teaching children to move their body in meaningful ways, they begin to make a conscious effort to do so. They begin to understand that by incorporating these movements, they are able to use different parts of their brain that they may have struggled to use before. This idea of using their whole brain has been a focus in the development of the Brain Gym program (Dennison & Dennison, 1994).

Dennison claims that doing the Brain Gym movements can have a positive impact on student learning. One way Brain Gym is beneficial is that it provides movements that allow information to travel to both halves of the brain by reducing stress. As previously stated, stress has been shown to have an impact on learning. It also has been shown to hinder memory function because blood is flowing to muscles in preparation for the body’s natural fight/flight instinct. When blood is taken away from the brain and is channeled to other parts of the body, communication between parts of the brain is impacted. Brain Gym movements increase circulation of blood and oxygen through the brain to allow for better function (Jager, 2001).

Brain Gym is still a fairly new educational program. Many people are still investigating the benefits and claims of the movements. Some, such as Bengtson, Perry, Hannaford and Horsley, have begun to do research in their own classrooms.

This has been made possible by the publishing of different teacher guides that explain the theory behind Brain Gym, as well as the different movements and the anticipated effect of each.

In the revised teacher's edition of Brain Gym, Dennison and Dennison organize the movements based on the desired outcome. These movements are separated into three topics, midline movements, lengthening activities and energy exercises. Midline movements focus on the movements that cross the midline of the brain and allow it to work as a whole brain while improving communication and flow between the hemispheres. Lengthening activities focus on allowing the students to make connections between the front and back of the brain. By enabling this, lengthening activities help people connect information they have previously acquired with the part of their brain that allows them to express information. The third category, energy exercises and deepening attitudes, focus on movements that help reestablish connections between the brain and the rest of the entire body (2003). The manual is also reorganized in a different format at the end of the book. This additional section lists academic areas, such as writing and math, and creates an inventory of different Brain Gym activities that can be used to enhance the specific academic area.

Koester, a former classroom teacher, was experienced in studying and implementing Brain Gym. She felt a concern that there was a need for a longitudinal research study to report the effects of Brain Gym on academics. Because of this, she decided to do a year long research project in an elementary school. Grades three

through five were targeted in this study. A control group did not use brain gym as part of their education, and the experimental group incorporated it into their daily schedule. The teachers of the experimental group also provided opportunities for students to participate in small group brain gym exercises. Brain Gym became part of their routine, and some students were seen practicing it even without teacher direction. Students who were having reading difficulties were seen by a licensed Brain Gym Consultant in small groups as well. The research found that Brain Gym had an impact on different facets of student learning. Not only did student attitude improve, but the atmosphere became more relaxed. Academically, the results were striking. Scores were taken from a reading test known as the Stanford 9. It was found that the students who were involved in Brain Gym improved their test scores. These students improved twice as much as the students who were not involved with Brain Gym activities (Koester, 2000).

In another study, Templeton & Jenson, looked at the fourth grade students' grades as indicators of change over the course of Brain Gym implementation. The results on academics were not as compelling as Koester's study. The academic information was collected over a period of nine weeks in which declines in grades, or no change in grades were noted more frequently than improvements in grades. The research did show, however, that in two specific areas, English and spelling, most of the students received higher grades than in previous marking periods (1996).

The idea that Brain Gym could possibly improve student achievement has intrigued many. Horsley decided to focus her study on the effects of Brain Gym on

reading comprehension. For this study, the researcher chose to use students in grades six through eight. These students ranged in socioeconomic status, academic ability and racial makeup. Horsley's student sample consisted of two groups. Both groups were tested using the Stafford Achievement Test. The only controlled variable was the use of Brain Gym in one of the classrooms (2004). By keeping the variables limited, the researcher was able to gain an accurate picture of the effectiveness of Brain Gym.

After five weeks, Horsley found that there was no significant statistical difference between the control group and the experimental group in regards to the pretest and posttest. However, the results did show an increase in the mean score of the experimental group. The same could not be said for the control group that actually showed a decline in their mean score (2004). Even a small improvement in academic success is worth the extra work. Although this study did not show a significant correlation, it does give researchers insight to the possible benefits of Brain Gym.

Both studies discussed above, as well as a study conducted by Hannaford previously cited, took academics into consideration as an evaluation tool. Although they did not have the same success, all studies did show growth in areas of reading and language arts. Additionally, these studies along with a project completed by Bengtson and Perry have looked at other means for evaluation.

Hannaford (1996) claimed that as she implemented Brain Gym, her students' attention and academic performance improved. In other studies, the repetitive gross motor activities involved with Brain Gym help to balance brain chemicals. As these

chemicals balance, they calm behavior and helped with certain aspects of Attention Deficit Disorder (ADD/ADHD) (Blaydes, 2001). The reason this behavior is often observed is that the ability to maintain attention and focus is related to brain chemistry. Research by Pieron, has shown that in a twenty-four hour period, the brain cycles in and out of focus and non-focus. He found that the brain is able to process information and increase learning if learning is interrupted by two to five minute long breaks (Reardon, 1999). Brain Gym provides students with a physical break from the act of sitting, and a mental break by revitalizing the brain and reconnecting the hemispheres.

Similar results were found by researchers who decided to study the effects of Brain Gym on student handwriting. The study, entitled *Effectiveness of the Brain Gym for improving the handwriting of first grade students*, focused on students in northern Minnesota. The main Brain Gym exercises used were “Brain Buttons”, “Cross Crawl”, “Hook Ups”, and “Lazy Eights”. Bengtson and Perry scored the Minnesota Handwriting Assessment (MHA) pre and post-integration of Brain Gym in the classroom. Although the researchers did not find a significant correlation between handwriting and Brain Gym, they did note an improvement in behaviors. Anecdotal records taken throughout the course of the study showed that students were less fidgety and were able to maintain focus and stay on task for a longer period of time. This behavior was especially observable in a group of boys who participated in the study (Bengtson & Perry, 2005). Through this study the researchers were able to find a benefit of Brain Gym without necessarily searching for it.

In addition to academics and attention, Brain Gym has also been shown to have an impact on motivation and attitude. As many educators know, motivation is a very important factor in student success. Leppo (2000) found that movement is essential to helping children work through the many challenges they face in our educational system. In a research study on motivation and listening, Armstrong and Rentz found that motivation and even listening skills can be improved through the use of Gardner's multiple intelligences, authentic types of assessments and brain based activities (2002). As children are given opportunities to move, they improve their ability to move and control their bodies. They also learn to problem solve and manipulate their environment which helps them to increase their self confidence. It has been shown that how children feel about themselves and their peers is connected to how they feel about their early movement skills (Armstrong & Rentz, 2002).

In Koester's year long study in an elementary school, as previously discussed, Brain Gym was implemented regularly. Koester found that not only did the students' self esteem improve, but the climate and feeling of the classroom became more relaxed (Koester, 2000). During observations of a study done in a separate fourth grade classroom the results were very similar. The students' attitude was very positive. The students in this particular study remarked that Brain Gym was fun. Their attitudes toward school were improved and as the new exercises were introduced, they enjoyed them (Templeton & Jenson, 1996).

Although Brain Gym is often used in classrooms to improve student learning, the Brain Gym program has been used with a variety of age groups showing that the

program is credible among a variety of situations. In a study conducted by Wolfson, four adults were chosen in order to find ways to help them meet their own personal goals. These goals included becoming a better pastor and a friend, building intimacy, finding lost computer disks and playing the piano. The researcher used an understanding of Piaget's understanding of "conservation" and Dennison's "balance" procedure. In this group of diverse learners, the goals were tested before and after the movements were employed. The researcher found an increase in all four participants with their understanding of their performance, as well as the performance itself (Wolfson, 2002).

Other research was completed on adults, and sought to explore whether Educational Kinesiology integration movements helped with response times of adults and whether repeated movements had any effect on the results. The research found that "Educational Kinesiology techniques may influence the processing capacity of the central nervous system through an integration of the hemispheric activity" (Siff & Khalsa, 1991, p. 1015).

Brain research has shown that the brain is a very complex organ. The research on the brain and Brain Gym help give insight on how to enhance education for students. Brain Gym has been implemented and researched by some who have found success with improving academic achievement, while others have shown improvements in other areas such as attitude and attention. With all that Brain Gym has to offer, further research is needed to document the effects that it has on student learning.

Chapter III

Introduction:

The students who participated in this study were third grade students in a suburban school district outside of Rochester. The main objective of the investigation was to determine if Brain Gym had an impact on student learning. The three main areas of student learning that the study focused on were motivation, attention and achievement.

Participants:

This study took place in a suburban district outside of Rochester with students from varied socio economic status. Students who received Academic Intervention Services (AIS) for mathematics and/or reading were evenly distributed in each classroom, as were students who had been identified as gifted or displayed above average achievement. The identified high-achieving students were placed into cluster groupings. The students who were directly involved in the study were in a classroom that included an enrichment cluster grouping of four students and various students who received AIS for reading and/or math.

Although all students participated in Brain Gym activities, four were selected as case studies. The students that were selected were those whose parents gave consent, and who themselves also gave consent to participate. Multiple students returned the parent consent forms. I chose four students by drawing names randomly. I separated the boys and girls, then drew two students from each group. The four

students were then allowed to choose a pseudonym to use while participating in the documentation portions of the study.

The first student chose the pseudonym Abby. Abby was a nine-year-old, female student who was at grade level in all academic areas. She was on monitor status for both math and reading due to poor test scores and teacher concerns in second grade. This means that the general education teacher paid close attention to her progress in these areas and that progress reports were sent home quarterly. Abby was an adopted child who lived with her adoptive mother and father. She was diagnosed with ODD (Oppositional Defiant Disorder). In school she was a very cooperative student, but had difficulties maintaining focus, especially during independent work. Many of her assignments were late or incomplete due to her taking extended time to complete the tasks. When the assignments were complete, they were accurate. Abby's need to take additional time to complete tasks prompted a recommendation to the Instructional Support Team for assistance with these issues.

The second student identified himself as Murphy. Murphy was also a nine-year-old student and was above grade level in all academic areas. He was identified as a high achiever in the areas of math and English Language Arts, which prompted his inclusion as a member of the enrichment cluster group placed in this classroom. Murphy lived at home with both parents and an older brother. Murphy thrived with group work, and tended to use mental computation to solve mathematical problems. Explaining how he found answers was an area that Murphy struggled with. He displayed a lack of attention during independent work time and had also been

previously recommended to the Instructional Support Team in second grade due to concerns with handwriting, balance, spatial awareness, difficulty following directions, and organization.

The third student chose the name Mike as his pseudonym. Mike was an eight-year-old student who lived with his mother and step-father. He visited his biological father on weekends. Mike was functioning at grade level in science, social studies, health and math. He was a hands-on learner who did well with activities that allowed him to manipulate objects to find an answer. He was below grade level in reading, writing and spelling. He received AIS services four times a week for thirty minutes per session. He had difficulty maintaining focus and attention in all educational situations, such as large and small group work, as well as independent work. He had been recommended to the Instructional Support Team numerous times for concerns with maintaining attention, and in third grade was also recommended for academic concerns in the area of English Language Arts. To help with focus, Mike used a sensory cushion to sit on, a timed bell that was set to go off every five minutes to remind him to attend to his assignments, as well as a timer that he was able to set to help him complete writing assignments. These interventions helped, but the concerns with attention continued.

The fourth student chose to identify herself as Jen. Jen was an eight-year-old female who lived with her mother and sister. Her father lived out of state and was seen only a few times a year. Jen was functioning at grade level in all academic areas and had a strong desire to do well. She always finished her work on time and had

immaculate homework habits. She was an average achieving child who scored mostly B's on her report cards. The only area where she had some difficulty was reading specific directions. Often her desire to complete tasks caused her to rush and she would overlook details in questions or written directions.

Procedures of Study:

I incorporated Brain Gym into different aspects of my classroom routine. All students participated in Brain Gym during the sessions. I began my study by providing each of the students with a water bottle. Dennison (1994) identified water as a crucial substance to keep the brain and body hydrated. When the brain is hydrated, it is able to function better. The students were given specific directions on how to use their water bottle and to drink water frequently throughout the day.

After introducing the water bottles, I talked to the students and explained how the brain is split into two hemispheres. After a brief conversation about each of the hemispheres and what the different roles of each hemisphere were, I introduced the Brain Gym program. The students were given background on the theory of Brain Gym and how it was supposed to help them to function as a student. I began using Brain Gym during morning meeting time which I held in my classroom on a daily basis. This took place first thing in the morning and lasted about fifteen minutes. I often used this time to introduce new Brain Gym movements and explain how they helped the students. Most of the time, the Brain Gym movements that were done at morning meeting included those that specifically worked on reading and writing skills.

These movements were chosen because the following work time included activities centered around reading and writing.

The three most frequently used Brain Gym activities included Brain Buttons, Cross Crawl, and Neck Rolls. The Cross Crawl is an exercise that requires students to walk in place while alternately moving their arms and legs. They moved their right arm and touched it to their left leg, and vice versa. Alternate ways to do this activity included reaching behind the back to touch a foot with the hand from the opposite side of the body. This movement helps to cross the midline and improve vision in both eyes. It also focused on the following skill areas: spelling, writing, listening, reading and comprehension.

Brain Buttons was also frequently used during morning meeting. For this activity, the students placed one hand just below their clavicle and massaged that area while holding the other hand over their navel. Brain Buttons helped stimulate arteries that supply blood to the brain and helps to send messages from one brain hemisphere to the other. It focuses on areas such as writing, reading, correction of letter and number reversals, consonant blending and keeping one's place while reading.

The third activity frequently implemented during morning meeting was the Neck Roll. Neck Rolls were done with the head in the forward position only. Complete neck rotations were not recommended in the Brain Gym manual. The students did deep breathing while rolling their head from side to side. The neck rolls focused on relaxation, reading and writing skills.

Brain Gym was also implemented in small intervals that totaled about fifteen minutes each day. Brain Gym techniques were used during transitions between curricular areas, most often between transitions from special subjects to the classroom and from science to math. Additionally, I used Brain Gym movements during different subjects to provide movement and refocusing when the students were required to sit for an extended period of time. Before math, the two most frequently used brain gym activities included the Owl and the Elephant.

The Owl movement required the students to grasp their shoulder and squeeze their shoulder muscles. While doing this, the students turned their heads to look over the same shoulder, then moving the head to look over the opposite shoulder. Repetitions were done by alternating hands. This activity focused on improving long and short term memory, mathematical computation and computer work.

The Elephant, similar to the Owl, was used to improve short and long term memory especially with math or digit spans. The Elephant also helped with listening comprehension, speech and spelling. To do the Elephant, students relaxed their neck and held their arm out as an elephant trunk. I had the students stand with their legs slightly bent and pretend they had attached their head to their arm. The students would then use their extended arm to make the motion of a figure eight. As they did this, they looked past their hand and crossed their visual field.

Instruments for Study:

To document the effects of Brain Gym, I used student surveys (see Appendices D and E) and interviews (see Appendices F and G) at two different points

in the research time frame to collect data on the four case study students. The first round interviews and surveys were given prior to the implementation of Brain Gym and the second round of interviews and surveys were given after the implementation of Brain Gym. The interviews and surveys focused on motivation and attention. I interviewed each child individually during a time when they did not miss any curricular instruction. I used various times, such as recess and DEAR time, to conference with the students. I asked them the questions written on the interview form, and recorded their answers as they were talking.

The surveys were given to the four students as a group. I asked them to fill it out before instruction began in the morning. I assisted them with the directions, and read the statements to the students to ensure that they understood each statement. After I read each statement, the students responded by circling the corresponding level of agreement on the scale provided. I made sure that the students had folders to separate them and keep their answers confidential.

In addition to this, I also took a variety of field notes and anecdotal records to document time on task, attention and perceived motivation. I completed these observations at different times throughout the day. Some were done before lessons, some during and some after the conclusion of the lesson in all curricular areas. Most of my notes were incomplete sentences jotted down so I could remember the important information. After the students left, I took the information and typed it into a log. I also had formal observations (see Appendix C) done on all four students before and again after the implementation of Brain Gym.

In addition to this information, I collected work samples from the students before the implementation of Brain Gym as well as during Brain Gym. The work samples consisted of a variety of subjects as well as numerical averages from each assessed subject during the time Brain Gym was being implemented.

Chapter IV

Throughout this study, I was able to gather information from the students that reflected their motivation, attention and achievement. This information was gathered prior to and during the implementation of Brain Gym. The data was gathered in a number of ways. Two surveys were given. One was given prior to the implementation, and the other was given after Brain Gym had been implemented for a month. Additionally, two interviews were also completed. One was completed prior to the implementation of Brain Gym, and the other after we had been doing Brain Gym for a month. To further gather data on the effects of Brain Gym, I also took anecdotal records throughout the study, gathered work samples prior to and throughout the study and had formal observations done on my four case study students. One observation was done before Brain Gym began and the other after we had been doing Brain Gym for a month. The results were interesting.

The anecdotal records I took throughout the implementation of Brain Gym gave me insight on how the students were doing with the program. The first two weeks of Brain Gym seemed to be a time of transition. The students were getting used to the program and it changed their daily routines. The notes I kept were general observations about the four case study students that I chose to focus on for this investigation.

The student who chose to call himself Mike was one that I had many observations on. As one of my most academically and behaviorally needy students,

much of my attention was drawn to him. My notes from the first two weeks mention different aspects of his behavior, such as “laughing and poking at other children while doing Brain Gym at the carpet” or “spinning in circles while a new Brain Gym movement was being taught”. The last two weeks of the investigation seemed to show a change in his behavior and attitude towards Brain Gym. It was around this time that I began to allow the children to take turns leading Brain Gym in the morning. He often raised his hand to lead the different exercises, and began to follow the directions. I noticed more than once that he “even closed his eyes during the Brain Buttons activity”. On two separate occasions, I commented on how he had asked to use Brain Gym on his own. One request was during independent work, and the other was during social studies. The biggest difference I saw with Mike was that his self-control improved over this month of observations.

The second most noted case study student was Abby. She was also a very needy student in respect to attention. During Brain Gym, I noted that she was “quiet but compliant”. Throughout the study she always completed everything she was told to do and followed the directions willingly. She never volunteered to lead the exercises and was never observed doing Brain Gym movements independently.

At the beginning of the study, most of my observations of Abby included things such as, “staring off into space”, “taking extended time to complete tasks (in all academic areas)”, and “sat quietly at her desk, but did not complete independent work”. Throughout the study I did begin to notice some changes in Abby’s work ethic and ability to complete her work. Towards the end of the study she was

completing more of her work in the time provided, requiring her to take home less work to complete. She also began to complete more of her independent work. During reading group, her work was complete and accurate, and she began to share her work more. I noted once that when I looked up at her during independent work time she was, “helping Mike and explaining directions to him, after she did this, she went right back to work!” The progress that I noted with Abby was not consistent everyday, but the number of days that she was on task and focused was in the last two weeks of the study were almost twice much as the first two weeks of the study.

The third student included in the case study group was Murphy. Murphy is a highly intelligent boy. At times, he lacked attention and focus, and organization has always been an issue with him. When I began to introduce Brain Gym, my notes reminded me that he was one of my most enthusiastic students. He volunteered information about the right and left hemispheres of the brain and was very interested in what Brain Gym could do to help the two hemispheres communicate.

The notes I kept on Murphy showed that although he was focused and took Brain Gym seriously, his behaviors did not change dramatically. I noted that on many occasions he was, “staring off into space”, “fiddling with items on his desk”, and had problems maintaining his focus during independent work time. Once he was focused, he was able to complete his tasks quickly and accurately.

The fourth case study student, Jen, was almost always on task throughout the duration of the investigation. She continually completed tasks on time and was often the student others would approach when they did not know what to do. At the

beginning of the study, Jen lacked accuracy in her work. Although her work was complete, it did not show that she understood the directions or the material. This observation was made in all subject areas. Throughout the study, she became more attuned to detail and aware of the mistakes she was making. She even led four different Brain Gym sessions. She chose the movement and gave the students accurate instruction on how to complete the movement.

In addition to the notes I kept throughout the study, the students also completed surveys before (survey #1) and after (survey #2) the implementation of Brain Gym. Table 1 gives a breakdown of each survey question and how each of the students answered the questions before the implementation of Brain Gym. Table 2 does the same for the survey given after Brain Gym had been implemented for a month. Table 3 through Table 10 show the comparison of the perceived positive statements in the first and second survey for each student. The results from the two surveys are found below.

Table 1: Results from Survey # 1

Statement	Jen	Murphy	Mike	Abby
1. School is fun for me.	3	4	1	2
2. I always try to do my best.	4	4	4	4
3. I want to succeed.	4	4	4	4
4. I find it easy to pay attention in school.	3	3	1	1
5. I feel fidgety sometimes and want to move around.	4	2	4	3
6. I lose my concentration when I am working alone.	3	4	4	4
7. I pay attention when the teacher is teaching.	4	3	3	4
8. I participate when I am doing group work.	4	4	4	4
9. I feel proud of how I behave in school.	3	4	4	4
10. I feel proud of my grades in school.	2	4	4	4

Scale indicators: 1-Does not describe me, 2-Sort of describes me, 3-Pretty much

describes me, 4-Definitely describes me

After analyzing the results of the survey, I noticed some things about the students that allowed me to evaluate their answers. With the exception of statements five and six, the questions were all worded positively. Statements five and six actually use wording that addressed perceived negative behaviors. These questions were purposely placed toward the center of the survey to ensure that the students were reading each statement and responding appropriately.

In general, all four students had a positive attitude and motivation towards school. They all stated that they try their best and that they want to succeed. Their responses also indicated that they pay attention while the teacher is teaching,

participate efficiently in group work and are generally proud of their behavior and grades in school.

Another commonality among the students was that in general, they had a hard time maintaining attention. All four students commented that they lost their concentration when working alone. Jen was the only student who did not select, “Definitely describes me”, but she did respond with, “Pretty much describes me”. Additionally, three of the four students selected numbers that indicated they often felt fidgety and needed to move around more. These results told me that I was not giving my students enough time for meaningful movement throughout the day.

As I further studied the chart, I noticed that all four students had a different answer for the statement, “School is fun for me”. While Jen and Murphy enjoyed school, Abby and Mike had more negative perceptions about how much fun they had at school. Consequently, these students had some academic challenges, while the other two were meeting or exceeding grade level standards.

Analyzing the initial responses on the survey before the implementation of Brain Gym allowed me to get a better sense of each student and their feelings toward school. I was able to make generalizations about my teaching and the frequency that I should use to implement Brain Gym in order to provide the students with sufficient movement.

Table 2: Results from Survey # 2

Statement	Jen	Murphy	Mike	Abby
1. School is fun for me.	4	4	4	3
2. I always try to do my best.	4	4	4	4
3. I want to succeed.	4	4	4	3
4. I find it easy to pay attention in school.	2	3	2	2
5. I feel fidgety sometimes and want to move around.	2	3	4	3
6. I lose my concentration when I am working alone.	3	1	1	3
7. I pay attention when the teacher is teaching.	4	3	3	4
8. I participate when I am doing group work.	4	4	3	4
9. I feel proud of how I behave in school.	4	3	1	4
10. I feel proud of my grades in school.	2	3	4	4
11. <i>I liked Brain Gym.</i>	4	2	4	4
12. <i>Brain Gym helped me pay attention.</i>	2	3	4	4
13. <i>I felt better during school when we were doing Brain Gym.</i>	2	1	4	4
14. <i>I looked forward to school knowing we would be doing Brain Gym.</i>	2	2	4	4
15. <i>I felt like Brain Gym helped me be a better student.</i>	1	1	3	4
16. <i>I will use Brain Gym next year.</i>	2	3	4	4

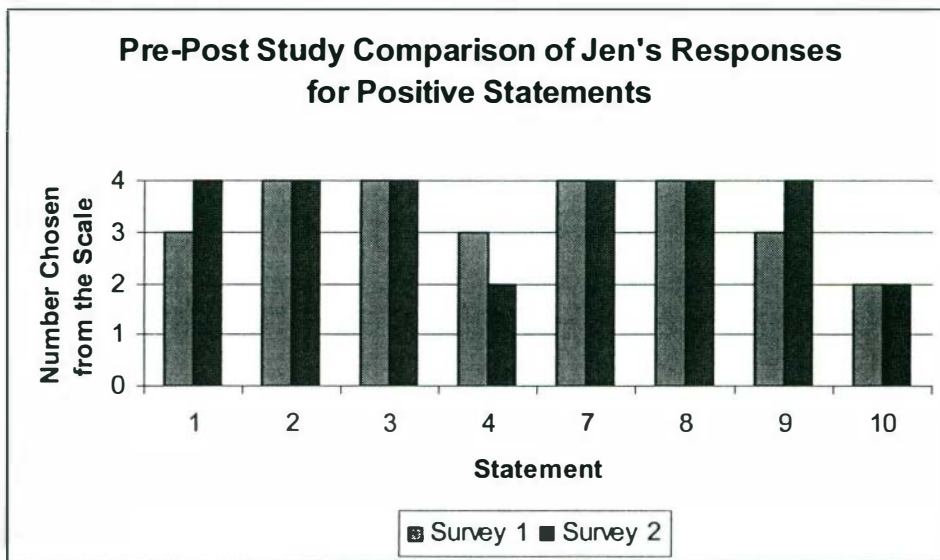
Scale indicators: 1-Does not describe me, 2-Sort of describes me, 3-Pretty much describes me, 4-Definitely describes me

As I analyzed the results from the second survey, I immediately noticed some changes in the student responses. I will discuss these as I analyze each student individually. In addition to repeating the first ten statements, I also included an additional six that directly related to the students' perception of Brain Gym as a program. These statements focused on their perception of the usefulness of Brain Gym as well as the enjoyment of the activities. Three out of the four students' answers indicated that they enjoyed Brain Gym, and that they would use Brain Gym

next year. These answers were encouraging and showed that in general the students did enjoy this experience.

While three out of four of the students' answers indicated that they felt Brain Gym helped them pay attention, the other responses were split. The two students who seemed to have the most difficulty in school responded to the survey questions more positively. They responded that they felt better in school while doing Brain Gym and actually looked forward to school knowing they would be doing Brain Gym. The two students who seemed to be more adept in meeting grade level standards responded that they did not necessarily feel better because of Brain Gym and that doing Brain Gym did not really cause them to look forward to school.

Table 3:



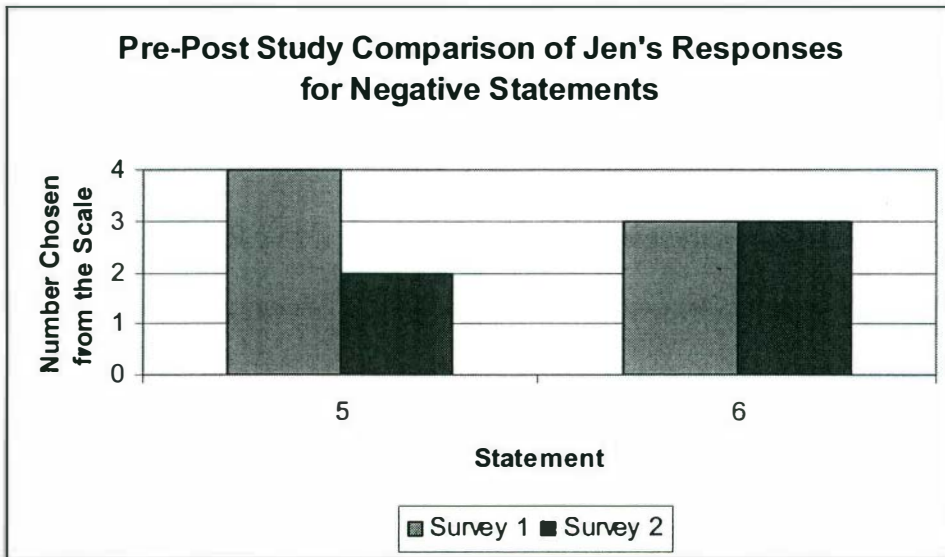
After examining the two surveys, some changes appeared in the student responses. Jen's responses the second time did yield different results than the first.

The first change that was shown is that Jen enjoyed school more. Her answers about trying to succeed and doing her best stayed the same, as they were both very strong before. Another area that increased was that she was taking more pride in her grades than she did during the month prior to Brain Gym. It was reassuring to see that she valued her grades and was enjoying school more. The increases in motivation were helping her to gain confidence and pride in her work.

One interesting change in Jen's response is that before Brain Gym began, she found it easier to pay attention in school. While her response to paying attention while the teacher is teaching remained the same, she is having more difficulty with independent work time. This response is the only positive statement about academics, motivation and attention that her response declined. Over all, her attitude about school either remained highly positive or increased.

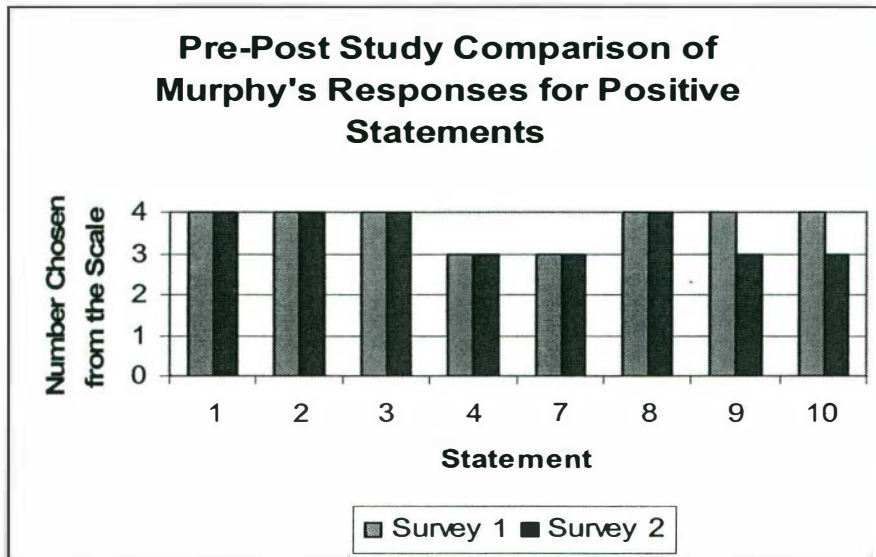
Data collected revealing Jen's responses appear in table four, found on the next page.

Table 4:



After analyzing the two statements that were worded in a negative way there was a change of two points in one response. Prior to the implementation of Brain Gym, Jen responded to, “I feel fidgety sometimes and want to move around” with “Definitely describes me”. After doing Brain Gym for a month, her response changed to “Sort of describes me”. This decline in her urge to move around was big. Although this area improved, she continued to lose her concentration when she was working alone. For Jen, Brain Gym gave her opportunities to move in a meaningful way, but it had not had a significant impact on helping her maintain her focus while working alone. This was consistent with the positively worded questions as well.

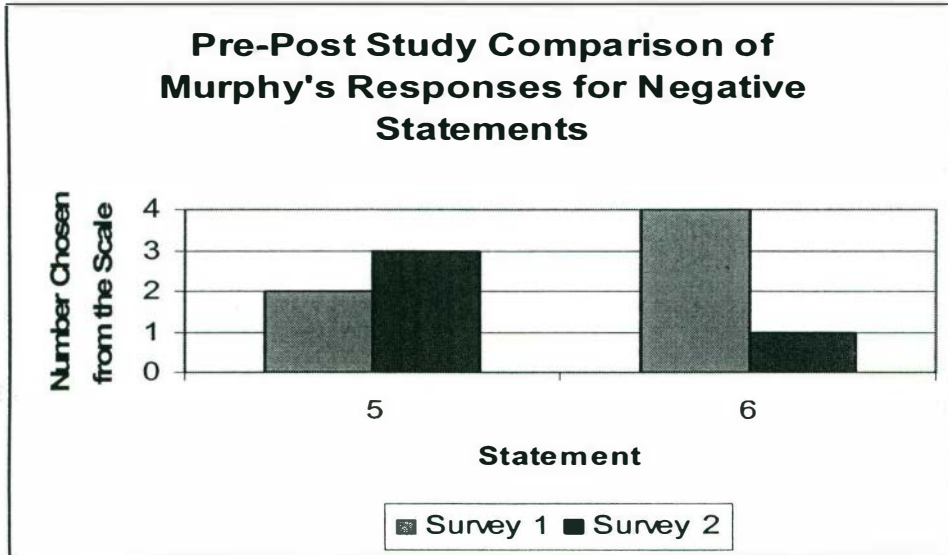
Table 5:



According to Murphy's responses, his feelings about the enjoyment of school, his motivation in school, and his attention in school remained the same after participating in Brain Gym for a month. Many of his responses were highly positive and were not changed by his participation in Brain Gym.

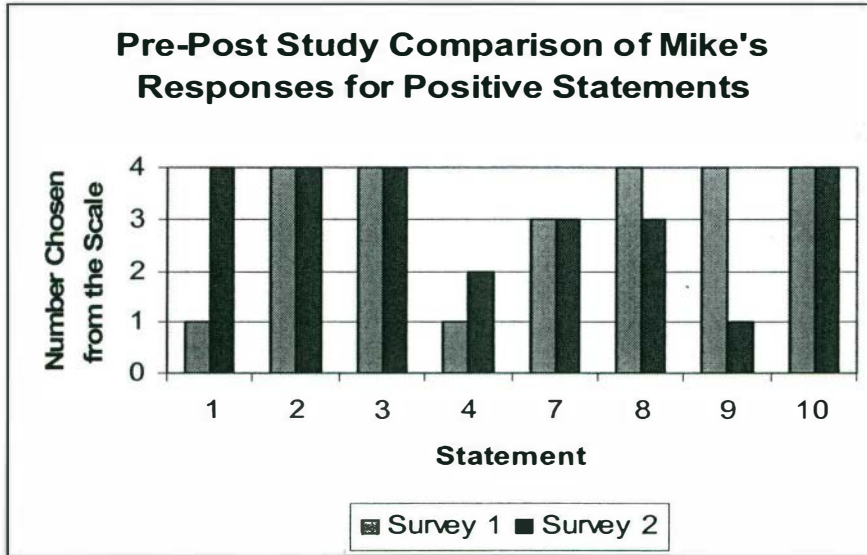
Although Murphy generally had a positive attitude about school, two areas declined after the month-long implementation of Brain Gym. These two questions dealt with taking pride in behavior and grades. While Murphy's behaviors did not necessarily change, he seemed to understand that some of them were not appropriate and internalized that he was not doing what he should be doing. Murphy was also accurate in his grades as well. His reading grade declined throughout the month that Brain Gym was implemented due mostly to his difficulties attending to work independently.

Table 6:



When it came to the negatively worded statements, Murphy's answers both changed. In comparison between before Brain Gym was implemented, and after, Murphy's response indicates that he feels more fidgety throughout the day. This answer was a little surprising due to the fact that the students were physically moving more. Additionally, his response to the sixth statement indicates that he was able to concentrate better while working alone. After reviewing my anecdotal notes, I noticed that working alone was challenging for him. He would often seem to be staring off, or playing with items in his desk instead of doing work. The frequency of his distractions may have decreased, but he was still easily distracted.

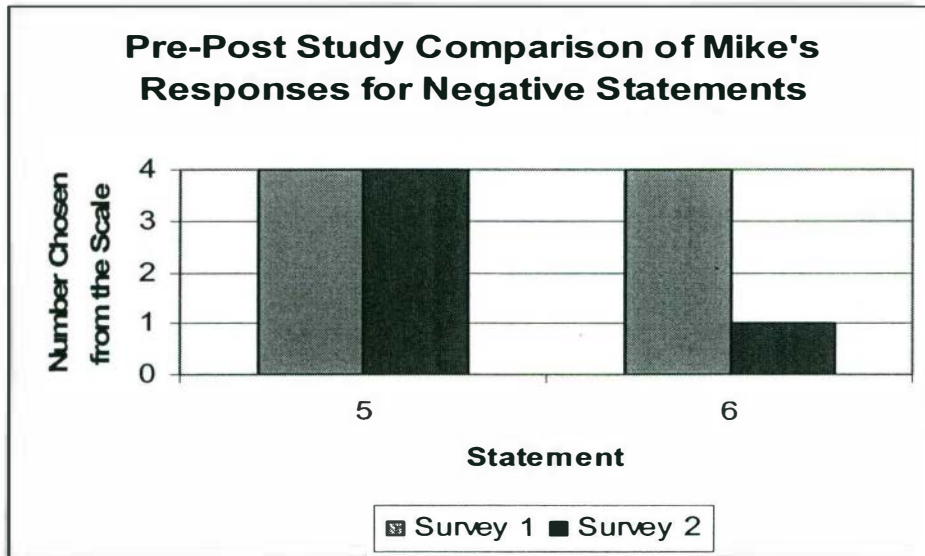
Table 7:



Mike's surveys yielded some interesting information. He stayed consistently high in areas such as; always trying to do his best, wanting to succeed, paying attention while the teacher is teaching and taking pride in his behavior at school. There were also two areas that improved for Mike. The most dramatic improvement was that school was more fun for him after the month long Brain Gym study. His attitude about school improved dramatically. Additionally, his attention improved. His response indicated that he felt he was able to pay attention better after the month long Brain Gym study.

In addition to the areas that improved, there were two areas that declined for Mike. When it came to participating in group work, his response indicated that this statement did not describe him as much as it did before. Furthermore, he did not feel as proud of his behavior as he had previously.

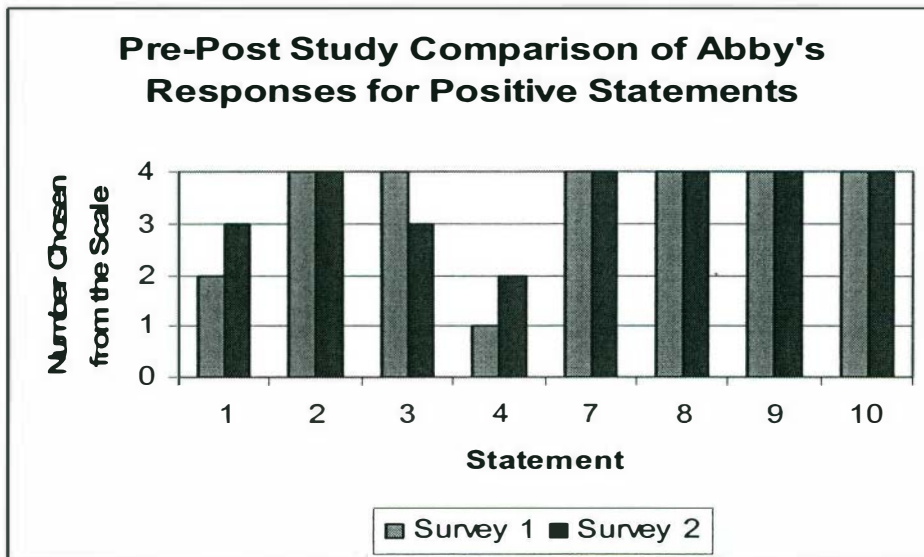
Table 8:



After analyzing the two negatively worded statements, I found that Mike still felt “fidgety” throughout the day and felt a need to move more. This is something that has not changed and was observable in my notes.

Mike’s response to statement six was encouraging. Prior to the implementation of Brain Gym, Mike’s response reflected his difficulty maintaining his focus and concentration while working alone. After the month of Brain Gym, he indicated that the statement no longer described him. He was able to attend to independent tasks for longer periods of time, and completed a greater amount of work than he had all year. This increase in concentration has been a positive change for Mike.

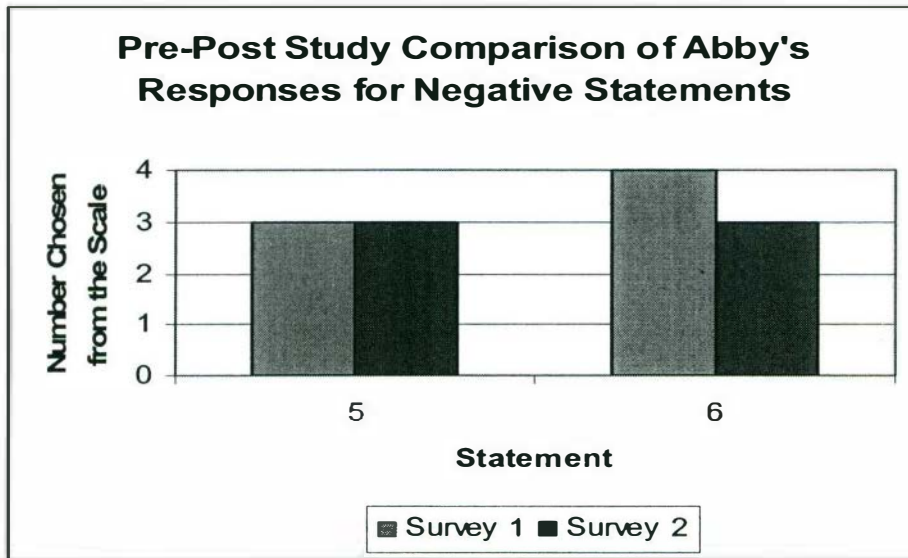
Table 9:



The results of Abby's surveys were very similar in many respects. She was consistently positive when it came to feeling proud of her behavior and grades, participation in group work, and paying attention while the teacher was teaching. She also responded that she always tries to do her best. This is something that I would agree with. Two additional areas showed improvements after the implementation of Brain Gym. School became more enjoyable for her, and she found it a little easier to pay attention in school. This improvement is encouraging because she was being screened for ADHD.

The only area that declined for Abby was the statement about wanting to succeed. Her response to this statement indicated that she still has that drive to succeed, but it is not as strong as before.

Table 10:



Abby's results from the two negatively worded statements were also fairly consistent. Although she still felt fidgety throughout the day and had the urge to move around, her behavior did not exhibit this behavior. Also, according to her response, her ability to maintain her concentration while working alone was still an area of difficulty, but had improved after the implementation of Brain Gym. This improvement in concentration, even though it was not dramatic, was encouraging.

The questions asked in the interview focused on student attitude, motivation and attention. Generally speaking, all four students felt good about school. The students mentioned different reasons why they enjoyed school both before and after the Brain Gym study. Abby even mentioned that she, "...felt better since we started Brain Gym because it helped [her] pay attention more". This was such a powerful statement and it showed me that at least for her, Brain Gym had improved her attention.

One interesting discovery that I uncovered while comparing the interview results was that three out of the four students identified either reading, math or both as the subjects they found it easy to pay attention to. What was fascinating was that these were the subjects that directly followed our whole class Brain Gym activities.

When it came to movement in the classroom, two students thought they had sufficient movement, while one other two identified moving in the hallway and in lunch as the most prevalent times for movement. These responses stayed similar, even after the implementation of Brain Gym.

After the month long implementation of Brain Gym, I also included five additional questions about brain gym. The first question asked what the students liked or disliked about Brain Gym. All students mentioned things that they liked. Some included that it taught them to be a better student, the movements were fun and one student responded that he liked it because it helped him to, "...do the things [he] is supposed to do in school". Only one student listed something they disliked, and that was that he still had a hard time focusing on his work.

The next question asked if the students thought Brain Gym could help students in class. All four students responded positively. Some of their answers included that Brain Gym helps students to pay attention and get their work done. Some mentioned that they felt better about their grades and mentioned that Brain Gym helped them focus and complete work (i.e. centers and literature circle tasks). The last student felt that it helped students by linking their left and right brain so that

it worked better. The answers given from these questions showed a positive attitude toward school and Brain Gym.

The third question I posed was whether or not Brain Gym helped them. Three of the four students said that it did. All three mentioned that they felt their concentration had improved and that allowed them to do a better job in school. Some mentioned that they were able to finish more work, which helped them get better grades. Murphy said that it did not really have an effect on him.

The last question I asked them was whether or not they had noticed changes in the classroom since we had begun Brain Gym. Abby remarked how she got most of her work done; Bryce noticed that the other students had been getting to work quicker and finishing faster. Jen mentioned that she had noticed people moving up into higher spelling groups and that the noise level had gone down. Murphy said that he did not see any changes. Overall, these answers show that Brain Gym has helped them to become more motivated to do their work, which has helped them academically. Additionally, three out of four students noted that they could concentrate better.

One of the most powerful tools that I was able to use to document behaviors of students was observations. Using the observation form, (see appendix E), one formal observation was done on each student before the implementation of Brain Gym, and another was completed after using Brain Gym for a month.

Each student displayed improvements in the areas included in the observation form. These areas could be split into three sections; motivation and attention,

interactions with others, and attention and work completion. Jen's second observation showed that she had grown in two areas. Her attention and motivation increased and she diligently attended to tasks independently. She also showed growth in attention and work completion. One noted improvement was that she was able to work with fewer distractions. She quickly transitioned between tasks and maintained her focus throughout. Her interactions with others remained consistently positive in both observations. Overall, her observation checklist showed that in her second observation she was more consistent in all areas.

After comparing Abby's pre and post observations, her growth was noticeable. There were eleven behaviors on the observation chart. Her first observation showed all inconsistent behaviors except one item checked as "consistent" and another as "rarely". Her post observation included five consistent behaviors and five inconsistent behaviors. One item was not applicable during the second observation.

The areas that Abby showed the most growth were attention, motivation and work completion. After the month long study on Brain Gym, she was consistently following directions, attempting the tasks, working with normal distractions, displaying appropriate activity level and responding appropriately to teacher requests. One change was in the first observation; there were many comments on how easily she got off task and how fidgety she was. The second observation remarked on how "surprisingly still she was".

In addition to this, almost all of the behaviors noted as being inconsistent were grouped in the section on interactions with others. What is interesting about the

noted behaviors is that although she was inconsistent in these areas, they had changed. The first observation noted her playing with others and talking to neighbors during inappropriate times. The second observation placed her in the inconsistent category for this because she was so quiet. She did not respond to others when they talked to her. This change in behavior shows an improvement.

Mike's two observations also showed improvements. Although he remained inconsistent in motivation and attention with respects to working independently, he did show growth in other areas. His interactions with other students improved immensely. Prior to this study, he was argumentative with his partner and tapped other students with his pencil. After the month long implementation of Brain Gym, my observations found him asking appropriate questions to others and working well with another student. He also showed improvements by displaying appropriate behaviors and activity levels consistently. Although Mike still has room to improve, he has come a long way. The effect that Brain Gym has had on his attention and behavior is evident through these observations.

Murphy's observations showed a mix of changes. In some areas he had improved, while in others he declined. When it came to attention and motivation, Murphy was mixed. Prior to the beginning of Brain Gym, he followed directions and attempted the tasks consistently. After the month long study of Brain Gym, these were inconsistent partly because he needed to be redirected. His ability to attend to tasks independently did improve, as did his task completion. His second observation

showed that he was distracted by classroom activities and seemed to be fidgety in his seat.

Some of the changes seen in the observations may have been caused by a different type of activity. The first observation was done during a game-like math activity, while the second was done during science. The students were measuring larva and he was almost mesmerized by his larva. He spent a lot of time staring at it and singing to it. Although he needed to be redirected to his task, he did complete the task and was accurate.

In order to determine whether Brain Gym had an effect on academics, I gathered work samples and kept averages from the four weeks before and the four weeks after the Brain Gym study. The averages did not show any significant change. The case study students had similar averages in all subjects. There were slight improvements in some areas, including math and writing. There were no declines in averages throughout this study.

After analyzing the student work samples, I found that although the numeric averages had not been significantly changed, the work of the students had improved. Most of the improvements were in task completion. Prior to the start of the Brain Gym study, three of the four students had not been regularly completing their center planners each week. Murphy completed on average 75% of his planner each week. Abby completed about 50% of her centers, and Mike completed about 25% of his centers.

After the four week study, Murphy was completing anywhere from 85% to 100% of his centers. Abby and Mike also showed improvements. Both were completing about 80% of their centers. On the last week, Abby completed all of her centers. The improvements in the students' independent work skills have helped them to finish the activities improve some of their scores in reading and writing. Not only that, but their assignments were getting done in a more reasonable time frame.

I also noticed a difference in the students' writing. The students were focusing on a new writing trait, word choice, during the four weeks of the Brain Gym study. In these four weeks, all four students completed their writing pieces. Prior to the study, it took Murphy, Abby and Mike about six weeks to do one writing piece. I noticed that they were writing was of higher quality in reference to sentence structure, conventions and ideas. The length of their writing increased, as did the amount of details included in the writing. Additionally, I noticed an improvement in handwriting with all four students.

Math was another area where I saw some improvements. When comparing the work samples from all four students, two common trends appeared. The first trend was that all students completed more work. On the work samples taken prior to the Brain Gym study, I marked how much had been completed and noted the time on them, especially if I noticed that the child was not working on task the whole time. In work samples taken from all four students, the amount of work completed had increased. Many times I would not have to mark the time on their paper because it was completed in a timely manner and the child had moved on to something else.

The second trend that I noticed was that the work was more accurate, especially with regards to written explanations. The biggest change was noted in Jen. Jen had always been the first to complete her work, but when I would check it, she would have many corrections to be made before it was handed in. During the time when we were using Brain Gym, she would take a little longer, but her work would be more accurate when I checked it. This showed me that she was able to attend to the task more fully and understand the problems she was given.

Chapter V

After completing research regarding Brain Gym I have a better understanding of how Brain Gym impacts student attention, motivation and achievement. Research has shown that allowing children to move throughout the day not only helps them to focus, but also helps them academically. Additionally, brain research has shown that incorporating cross body movements allows students to make neural connections between the two brain hemispheres. This helps students to make connections when presented information and to retain the information. My study focused on determining the effect Brain Gym had on student motivation, attention and achievement.

Motivation was a difficult quality to measure. Many of the indicators to show motivation are internal and are not always easily observed. In regards to student motivation, the surveys and interviews indicated that the students enjoyed Brain Gym. Most stated that they would continue to do Brain Gym and that it had a positive effect on their learning. School became more enjoyable for two of the four case study students and they looked forward to school knowing that they would be doing Brain Gym. Most students' observations showed that they increased in the area documenting their attempts to complete assigned tasks, which shows motivation to complete assignments. In all, I feel that Brain Gym had a positive, yet subtle effect on student motivation.

Attention seemed to be the area in which Brain Gym had the most significant impact. The observations that were done on the students were the most telling of the improvements. There were noted improvements in areas such as displaying appropriate activity levels, attending to tasks independently, following directions, working with normal classroom distractions, group participation and task completion.

The surveys also showed that some of the students had perceived an increase of attention as well. Some felt less fidgety and found it easier to focus while working independently. The interviews also indicated that the students felt Brain Gym helped them pay attention. Three out of the four case study students said that Brain Gym did help them in school. All mentioned how it either helped them to concentrate, or helped them to finish their work.

When it came to academics, Brain Gym also had a positive impact on them. Although the averages did not change drastically throughout the four-week period, with a longer study, I feel more dramatic changes would be seen. The reason I think this is because the quality of student work did improve. Their attention to detail in writing, along with getting tasks done in a shorter amount of time, were improvements that were evident in this study. Additionally, students were able to focus on a task for a longer period of time. If students are attending to their task or activity and can pay attention for a longer span of time, it is inevitable that they will learn more and retain a greater amount of information. This would in turn, affect their academic ability in a positive way.

When considering the educational system as it is today, it is shocking that many schools are cutting programs such as Physical Education. With the current research showing the positive correlation between movement and learning, school systems should take a more proactive approach to incorporate meaningful movement throughout the school day. The study I completed on Brain Gym showed me how beneficial this program, along with movement in general, can be in the classroom. If the time frame for my project had been expanded, I am sure I would have discovered even more about the benefits of Brain Gym in the classroom. I am just beginning to understand and analyze all of the effects that it has on students.

Lack of time was not the only challenge in completing this study. While researching the effects of Brain Gym, I found that there are not very many quantitative research studies completed in classrooms on file. Much of the research that does specifically discuss the effects in the classroom was found on the Brain Gym website and in the Brain Gym journal. The only way to gain access to these articles is to pay for a subscription to the magazine, or pay for copies of research articles directly from the website. Additionally, many of the studies included were studies prepared by teachers who had been trained in Brain Gym or Educational Kinesiology. In order for educators to learn more about the benefits of Brain Gym, more studies need to be finished to show the positive or negative impact it may have. As these research projects accumulate, it will be easier for one to make a more critical judgment about whether or not Brain Gym would be useful for the students in their classrooms.

After completing my research study, there are some things that I would change in order to make the study more fluid. As I introduced Brain Gym and incorporated it into our classroom routine, I found that in the beginning it was more of an intrusion than a natural transition. The students were used to their schedule and procedures that we had practiced since the beginning of the year. Since these procedures and schedules had been programmed so strongly into the students' routines, they had become part of the natural progression of learning. Brain Gym broke up that routine. This took the students a while to adjust to. I would recommend introducing Brain Gym in the beginning of the school year and incorporating it into the classroom procedures immediately. As the students begin to learn the different Brain Gym movements, they will not only learn more of them, but also begin to incorporate them easily into their school day.

Another recommendation I would make is to use Brain Gym throughout the year. By starting it in the beginning of the year, the students would reap the benefits all year round. My study was done in four weeks, and in those four weeks I saw some improvements. With a longer study, the improvements would grow. Students increased attention would have a greater impact on their achievement, and that in turn would affect their attitude, motivation and self-esteem.

As I was analyzing my data, I could not help but wonder what differences there would have been had I been formally trained to use and teach Brain Gym. I followed the teacher's manual closely, but a formal training would have prepared me even more for this undertaking. I hope that after sharing my findings with my

principal, she will aid me in attending some workshops and trainings in this field of education. As I become more versed in Brain Gym, I will be able to share my findings with others and hopefully help their students as well.

The information I found in my study is important for teachers, administrators, students and families to understand because if there is a way that we can help students enjoy school and achieve at a higher rate, more people should be doing it. Brain Gym is a fairly new program that may have benefits that many do not know about. Raising awareness of this program and its impact on student learning can help others to provide rich learning environments for their students and children as well.

After researching this topic, my professional beliefs regarding Brain Gym have strengthened. It is common knowledge that students need to move. I, as an adult, find it hard to sit through long periods of instruction. By incorporating movements that are meaningful and ones that create neural pathways, we can help students on multiple levels. They learn how to focus their energy and learn techniques they can employ even when they are not in school. When they learn Brain Gym techniques and the purpose behind them, the students are able to take that knowledge and apply it later on their own.

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Appendix A: Parent Consent Letter



Spencerport Central School District

TERRY TAYLOR ELEMENTARY SCHOOL

399 OGDEN PARMA TOWN LINE ROAD ~ SPENCERPORT, NY 14559

MONICA MACALUSO
PRINCIPAL

PHONE: (585) 349-5600
FAX: (585) 349-5666

Our Mission

to educate and inspire each student to love learning, pursue excellence and use knowledge, skills and attitudes to contribute respectfully and confidently to an ever-changing global community.

December 21, 2006

Dear Parent or Guardian,

As many of you know, I am a graduate student at SUNY Brockport. For my thesis class, I will be studying the effectiveness and benefits of using Brain Gym in my third grade classroom. Brain Gym is a program of physical movements designed to enhance student learning in all areas. As part of this project, I would like to give surveys and interviews to the students and take notes on my observations during the study.

If you grant consent for your child to participate in this study, he or she will be involved in the following:

- I will give your child a brief written survey at the beginning of the study, as well as at the end of the study.
- I will interview your child at the beginning of the study, as well as at the end of the study.
- I will collect and photocopy work samples completed by your child.
- I will take notes and observations during Brain Gym sessions and other related times.
- The surveys and interviews will be arranged with your child so that his or her classroom learning experiences are not disrupted.

I will use the data gathered to assess and analyze the effects of Brain Gym on students' attention, motivation and achievement.

The enclosed Guardian Consent form includes information about your child's rights as a project participant, including how I will protect your child's privacy. Please read the form carefully. If you are willing for your child to participate, please indicate your consent by signing the attached statement.

Thank you in advance for your consideration.

Sincerely,

Karen Gibbs

Karen Gibbs

Terry A. Taylor Elementary School

SPENCERPORT CENTRAL
SCHOOL DISTRICT
1 LYELL AVENUE
SPENCERPORT, NY 14559

(585) 349-5000

www.spencerportschools.org

Appendix B: Parent Consent Form

PARENT/GUARDIAN CONSENT FOR STUDY REGARDING THE EFFECTS OF
BRAIN GYM ON STUDENT LEARNING

1. I understand that my child/ward will participate in research to study the effects of Brain Gym on student learning. The research includes:
 - A. Two interviews and two written surveys completed by my child/ward.
 - B. Some of my child's class work may be photocopied and used in data collection.
 - C. My child's teacher will be taking notes on observations of my child's participation in the Brain Gym session and other related sessions.
 - D. My child's participation in the study will not disrupt my child's participation in regular classroom activities.

 2. The results of this research may be published or presented at professional conferences, as well as in the class for which the research is being done. The following steps will be taken to protect the confidentiality of my child's identity and the information he or she has contributed:
 - A. The last name and any other personally identifiable information will be deleted from all written documents.
 - B. Students will be identified by a pseudonym, age, and gender only. The school will not be identified.
 - C. Data collected from students will be kept in a locked drawer in my desk that is located in my classroom. After the study is complete, data will be shredded.

 3. Participation in the research project is voluntary. If I do not give permission for my child to participate in the study, my child will not be penalized in any way. My child may withdraw from participation in the research study at any time during the project and will not be penalized in any way. I can contact Miss Gibbs at 585/349.5601 at any times with questions about the project.

 4. I will be informed of any significant new information that may affect my willingness to give consent for my child to participate in the project.
-

____ Yes, I hereby consent to allow my minor child/ward, _____
to take part in the research project directed by Miss Gibbs.

Signature _____ Date _____

____ No, I do not consent to allow my minor child/ward, _____
to take part in the research project directed by Miss Gibbs.

Signature _____ Date _____

Appendix C: Child Consent Letter

**STATEMENT OF INFORMED CONSENT TO BE READ TO THIRD GRADE
STUDENTS**

As many of you know, I am taking a college course at SUNY Brockport. I am studying the effects of movement on student learning. I will be incorporating Brain Gym into some of our classroom routines and procedures. I will be asking you some questions about your learning and about Brain Gym, both in writing and in an interview. I will also collect some of your work and make copies to use in my study. I will also be taking notes in my journal about what I observe happening during Brain Gym as well as other times when it is appropriate.

If you decide to let me interview you, give you surveys, take notes on my observations and collect some of your student work I will use only your first name when I share your work with other teachers and researchers.

Your parent or guardian has given permission for you to take part in this project, but it's up to you to decide if you want to participate. If you decide to participate, but change your mind later on, you can tell me that you have changed your mind. It is okay to change your mind at any time.

If it is okay with you for me to interview you, give you two surveys, collect some of your work samples, write notes in my journal about what I observe and share the data with others, please write your name below. Beside your name, please print the date.

Thank you,

Miss Gibbs

I give my permission for Miss Gibbs to interview me, give me two surveys, collect some of my work samples, take notes on what she observes and share this information with others.

Name _____

Date _____

Appendix D: Student Survey 1

Code Name _____ Date _____

Brain Gym Survey # 1
To be completed prior to Brain Gym implementation

Please rank the following answers by circling the number that best represents your answer.

1. School is fun for me.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

2. I always try to do my best.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

3. I want to succeed.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

4. I find it easy to pay attention in school.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

5. I feel fidgety sometimes and want to move around.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

6. I loose my concentration when I am working alone.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

7. I pay attention when the teacher is teaching.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

8. I participate when I am doing group work.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

9. I feel proud of how I behave in school.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

10. I feel proud of my grades in school.

1 2 3 4
Does not describe me Sort of describes me Pretty much describes me Definitely describes me

Appendix E: Student Survey 2

Appendix F: Student Interview 1

Code Name _____ Date _____

Brain Gym Interview #1

The following questions are initial questions I will ask the students. I will also use probing questions to have students elaborate on their initial responses.

1. How do you feel about school?

2. What is your favorite subject? Why?

3. Do you think you get to move around enough during the day?

4. What do you think your strongest smart part is (This is the language we use in our classroom to talk about the multiple intelligences. We have completed surveys and the students have learned about their own "smart parts")?

5. Do you find it easy to pay attention in school?

6. What subjects do you think you can pay attention the best in?

7. Do you think you are a good student?

8. What do you know about Brain Gym?

Appendix G: Student Interview 2

Code Name _____ Date _____

Brain Gym Interview #2

The following questions are initial questions I will ask the students. I will also use probing questions to have students elaborate on their initial responses.

1. How do you feel about school?

2. What is your favorite subject? Why?

3. Do you think you get to move around enough during the day?

4. What do you think your strongest smart part is (This is the language we use in our classroom to talk about the multiple intelligences. We have completed surveys and the students have learned about their own “smart parts”)?

5. Do you find it easy to pay attention in school?

6. What subjects do you think you can pay attention the best in?

7. Do you think you are a good student?

8. What do you know about Brain Gym?

9. What do you like or dislike about Brain Gym?

10. Do you think Brain Gym can help students in class? How?

11. Did Brain Gym help you? How?

12. If you could choose to continue doing Brain Gym throughout the day, or to stop, which would you choose?

**13. Have you noticed changes in the classroom or learning since we began Brain Gym?
What changes and when?**

Appendix H: Observation Form

Classroom Observation

Student's Name: _____ Date: _____ Time: _____

Observer: _____ Grade: _____ Teacher: _____

Activity Observed: _____

Consistently Inconsistently Rarely Comments

	Consistently	Inconsistently	Rarely	
Followed directions				
Attempted assigned tasks				
Attended to tasks independently				
Responded appropriately to verbal/nonverbal requests by teacher				
Initiated teacher contact				
Initiated appropriate interaction with other children				
Responded appropriately when approached by other children				
Participated in group activities/discussions				
Was able to work with normal classroom distractions				
Student's activity level was situation appropriate				
Completed tasks during period observed				

Additional comments/observations:

Appendix I: Principal Consent Letter



Spencerport Central School District

TERRY TAYLOR ELEMENTARY SCHOOL

399 OGDEN PARMA TOWN LINE ROAD ~ SPENCERPORT, NY 14559

MONICA M. MACALUSO
PRINCIPAL

PHONE: (585) 349-5600
FAX: (585) 349-5666

October 30, 2006

SUNY Brockport Institutional Review Board
Dr. Sue Novinger, Education and Human Development

RE: Karen Gibbs

Dr. Sue Novinger,

I verify that Karen Gibbs teaches for the Spencerport School District. I have met with Karen in regard to an action research project entitled, "Study Regarding the Effects of Brain Gym on Student Learning." I have read the research proposal and give her approval to pursue this project in her classroom.

If you have any questions, please feel free to contact me at

Sincerely,

Monica M. Macaluso

Our Mission

is to educate and inspire each student to love learning, pursue excellence and use knowledge, skills and attitudes to contribute respectfully and confidently to an ever-changing global community.

SPENCERPORT CENTRAL
SCHOOL DISTRICT
71 LYELL AVENUE
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Appendix J: IRB Approval



SUNY BROCKPORT

Grants Development Director

To: Karen Gibbs
From: Colleen Donaldson, IRB Director
Date: December 1, 2006
Re: Project #: 2006-63

Project Title: Study Regarding the Effects of Brain Gym on Student Learning

Your proposal, "Study Regarding the Effects of Brain Gym on Student Learning" has been approved for one year from this date.

You must use only the approved consent form or informational letter and any applicable surveys or interview questions that have been approved by the IRB in conducting your project. If you desire to make any changes in these documents or the procedures that were approved by the IRB you must obtain approval from the IRB prior to implementing any changes.

If you wish to continue this project beyond one year, federal guidelines require IRB approval before the project can be approved for a second year. A reminder continuation letter will be sent to you in eleven months with the specific information that you will need to submit for continued approval of your project. Please note also that if the project initially required a full meeting of the IRB (Category III proposal) for the first review, then continuation of the project after one year will again require full IRB review.

Please contact Colleen Donaldson, IRB Director, Office of Academic Affairs, at or cdonalds@brockport.edu, **immediately** if:

- the project changes substantially,
- a subject is injured,
- the level of risk increases
- changes are needed in your consent document, survey or interview questions or other related materials.

Best wishes in conducting your research.