Brain Gym

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Brain Gym

by

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August 2006

A thesis submitted to the
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Master of Science in Education
Brain Gym

by

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Abstract

This study sought to determine the potential impact a program of exercises known as Brain Gym has on students' attention and ability to focus and retain information. Brain Gym consists of a series of physical activities that could possibly enhance learning ability. The research was conducted in an urban elementary school before math time. An entire first grade classroom was introduced to Brain Gym and the entire class participated in Brain Gym activities before math began. Specifically, six students' behaviors and achievements were observed and recorded to help determine if Brain Gym had an impact. Various research methods were utilized to collect data and a literature review was conducted in order to answer the question: Does Brain Gym, a program of exercises that can potentially impact students' attention and ability to focus and retain information, affect 1st grade students' behavior and achievement in math?
Chapter I

Statement of the Problem

Introduction

Movement in a classroom is generated consciously or unconsciously by the students. When movement is excessive it becomes a distraction in the classroom environment, causing students to lose their focus and negatively influencing achievement. This is a serious problem in classrooms across America. Suggestions for dealing with excessive movement, whether it is described as "hyperactivity," off-task behavior, or inattention, are abundant. However, finding which methods work best is a bit more difficult. Freeman-Koestar (2004) is a leading expert on one proposed method, the program known as Brain Gym. Brain Gym consists of a series of "... physical activities that enhances learning ability in special needs children as well as the general population," (p.1). What role can Brain Gym play in helping students refocus their attention?

Background

This research seeks to determine whether the use of Brain Gym has an effect on students' behavior and achievement in math. The study was conducted in an urban classroom in Upstate New York which serves a multicultural group of predominately low socioeconomic students in grades Pre-K through grade five. Data was collected in one classroom consisting of twenty-one first grade students, fourteen of whom were male and seven female. This group contained students from Hispanic (43%) and African American (57%) backgrounds. Each of these students receives free breakfast and free lunch. Data was collected on a target population of six of the twenty-one students.
The Research Question

Does Brain Gym, a program of exercises that can potentially impact students’ attention and ability to focus and retain information, affect 1st grade students’ behavior and achievement in math?

Method

A literature review was conducted to collect background information on the implementation of Brain Gym in other settings to summarize findings from previous research studies, and to determine sub-questions that would guide data collection for this study. Prior to implementation of Brain Gym in the classroom, baseline data was collected in order to describe students’ behavior and math achievement. This was also done for the purpose of selecting six students to be target subjects throughout the Brain Gym study. Student artifacts such as end of unit tests and checking for understanding were examined to establish student understanding. Behavior and engagement was observed and charted. Behavior and academic achievement charts were used to determine student performance and select target students.

In the second stage of the study, Brain Gym was introduced. All students in the classroom participated in the once a day exercises that occurred before math class. Additional data was collected on behavior, engagement, and achievement outcomes for the target students. An analysis of data collected before, during, and after Brain Gym was implemented and conducted to determine if there were significant relationship between students’ behavior and academic achievement pre-Brain Gym and post-Brain Gym.
Limitations

This study was limited to one first grade classroom in an urban setting. The participants in this study included six students and one instructor. Of these six students, one has been classified with an Individualized Education Plan (IEP) and another is in the process of being labeled and currently in the Education Support Services (ESS) stage.

Other variables that might have affected the outcome of this study include the time of day at which Brain Gym was conducted, the content and variety of Brain Gym activities, and the time of year this study took place.

The results of this study are specific to this particular classroom and cannot be generalized to other first grade classrooms with different economic status, social background, and instructional support.

Definitions of Terms

For the purpose of this study the following definitions of terms will be used.

- **Movement**: The act or process of moving especially the change of place or position.

- **Brain Gym**: A program of physical activities that enhances learning ability (Freeman-Koestar, 2000).

- **Checking for Understanding**: A quick and simple way to assess student understanding at the end of a lesson.

- **End of Unit Tests**: Tests that are conducted at the end of a unit to assess student understanding.
Chapter II

Literature Review

Question

The purpose of this study is to answer the question: Does Brain Gym, a program of exercises that can potentially impact students' attention and ability to focus and retain information, affect 1st grade students’ behavior and achievement in math?

Introduction

Educators are always looking for the next motivational practice to help their students pay closer attention to what is being taught. One such inspiration is Brain Gym. Freeman-Koestar (2000) describes Brain Gym as a "... program of physical activities that enhances learning ability in special needs children as well as the general population" (p.1). This series of exercises can potentially impact students' ability to refocus their attention on learning. The following review was conducted to discover what relationship exists between Brain Gym and students' attention and ability to retain information.

Motor Skills

The control of purposeful movement often requires attention (Schmidt & Lee, 2005). Motor skills in the classroom are no different. Requiring students to be able to imitate or observe task orientated movement in the classroom entails a certain amount of attention on their part. Schmidt and Lee (2005) note that the attention spans of individual children vary widely and that many children are not developmentally ready to attend for extended periods of time. Simply put, the classroom teacher may want a child to sit and pay attention through lengthy assignments, but this may be impractical for many children. Researchers, such as Poole, Miller, and Church (2005), suggest that, because of a
relationship between focused, conscious, movement and attention, children with early motor problems may have attention problems in the classroom.

There are many possible reasons children demonstrate motor difficulties. Some researchers (Poole, Miller, & Church, 2005) suggest that if a child is not given the adequate amount of encouragement and support he/she will be developmentally behind other children in motor ability. This encouragement and support includes such factors as an accommodating physical environment where the child is able to move about freely and the practice of motor skills such as grasping and balancing from a young age (Poole, Miller, & Church, 2005). When the development of a child’s motor skills lags behind other same age children, it impacts many other areas of development.

Gross Motor Skills

Gross motor skills encompass large, general movements of the body or parts of the body. The lack of gross motor control can lead to many disruptions in a classroom. When a child unintentionally knocks things off shelves and tables when playing or invades other children's personal space and tends to play “too rough” on the playground this lack of control could be a gross motor problem (Greenspan, 2005).

If children display signs of problems in gross motor development a simple place to start would be practice in the area in which they stumble (Greenspan, 2005). Greenspan (2005) suggests that this may appear to be an easy solution, but it is hard to implement because most children do not like to practice things at which they are not good. Another suggestion he makes to encourage gross motor development is to give clear, concise directions and only to give a few at a time. This strategy supports the commonly held notion that concentrating on more than one thing at a time is difficult for
many children and also illustrates the relationship between movement and attention (Schmidt & Lee, 2005).

**Fine Motor Skills**

Fine motor skills involve coordination of muscular, skeletal, and neurological functions to produce small, precise movements. These movements can include activities such as picking up a small object with a thumb and index finger or cutting small objects using a pair of scissors. One of the most obvious ways fine motor skills come into play in a classroom is the development of handwriting (Olsen, 2003).

Greenspan (2005) argues that many children who have difficulties with gross motor development often have problems with fine motor development. When a student struggles with fine motor skills it is in his/her nature to want to rush through a project and be done with it (Orloff, 2005). Students could have difficulties holding a crayon or pencil and printing letters (Greenspan, 2005). Orloff (2005) suggests that games such as jacks can help a student who is struggling with writing because this game requires smooth and automatic timing responses that are essential for smooth writing. However, Greenspan (2005) suggests that having the child slow down while trying to write will also help correct a handwriting problem.

**Movement**

We think of movement as the act or process of moving; especially the change of place or position or posture. Movement in a classroom happens throughout the day, and it is up to the classroom teacher to manage movement such as “transition-related movement” between activities and “instruction-related movement” that is part of group
work, games, or individualized learning. In both cases, this movement is planned and orchestrated by the teacher.

In a classroom, however, there is other movement that is generated consciously or unconsciously by the students themselves, and that can often disrupt the learning of the students involved or those around them. Examples include the movement of students who rest on their knees at their desk instead of sitting "properly" or the students who are unable to focus on the rug and repeatedly rock or roll around or chat with their neighbor. These purposeful movements may or may not be under the students' control. Yet, these are the students who might to be picked out of the crowd and disciplined for their inability to pay attention to the teacher. This excessive movement may sometimes be labeled hyperactivity (Barkley, 1995).

The human brain is so complex that reasons for these students' particular behaviors are not clearly understood. In the human brain there are a minimum of 1,000,000,000,000 individual neurons or nerve cells. Underlying this, between 100,000 and 1,000,000 different chemical reactions are taking place in a brain every minute (Sousa, 2005). Researchers have suggested that during this brain activity, misfires can occur and cause the brain to send out messages for the body to move (Buzan, 1991).

Reid and Hresko (1981) suggest that hyperactivity has a long and intimate relationship with learning disabilities. They believe that there are links between hyperactivity and brain damage, and between brain damage and learning disabilities. To this link, Reid and Hresko postulate that some researchers and practitioners believe that constant movement and learning disabilities are the same problem. Reid and Hresko (1981) point out, however, that despite this link, "there is no evidence to suggest
either that all learning disabled children are hyperactive or vice versa” (p.23). In fact, hyperactivity can be attributed to many factors, not just learning disabled students. According to medical findings hyperactive or ADHD (Attention Deficit Hyperactivity Disorder) students can display symptoms due to many different sources. Research indicates that ADHD tends to run in families, which leads to genetics issues (Friesen, 2005). Friesen (2005) also states that environment plays a part in ADHD and minimizing distractions and disruptions can make a big difference in attention.

Armstrong (1987) illustrates another perspective on movement: “Most American classrooms expose six and seven year olds to the fine print of blackboards, basal readers, and worksheets; require them to listen to teacher instruction for several hours a day; and confine them to desks for long periods of time. Yet, many of these children simply aren’t ready for this” (p.137). Armstrong believes that expecting this amount of attention and concentration from such young children can lead to the display of inappropriate movement. He suggests that if we let children enter into first grade based on their developmental readiness rather than when they were born, we would see a huge decrease in certain behavioral and instructional problems.

Looking at movement and how it affects attention span leads back to ADHD. According to Friesen (2005), ADHD is a neurobiological disorder that presents a persistent pattern of inattention that is more frequent and severe than is typically observed in students during development. He postulates that this disorder affects over two million children in the United States alone, and these are only the documented cases (Friesen, 2005). Is inattention really a problem in America’s classrooms? What steps
can be taken to overcome this issue and reduce ‘hyperactive-looking’ behaviors that result in inattention, lack of focus, and lower achievement in the classroom?

**Movement and Learning**

It is important to remember that children crave those moments where they can be active. How can educators embrace the connection between movement and learning suggested by researchers?

It is well known that children, young children especially enjoy being active and movement experiences can be great tools to motivate and facilitate learning (Leppo & Davis, 2005). When a child is involved in an activity where she is enjoying herself, she will learn better. Current research also supports this theory that regular physical activity for students of all ages may be an important component in improving classroom performance (Pierson, 2002). Pierson states that children who engage in daily physical activity show improved motor fitness, improved academic performance, and improved attitudes towards school. These major improvements can be directly connected to regular physical activity.

Often times we think that the body is merely the vessel in which the brain is carried and plays a limited role in learning. However, Hannaford (1996) contests that “the body’s senses feed the brain environmental information that it uses to form its understanding of the world and the more we use those senses, the more thinking and learning the brain can do” (p. 68).

Hannaford (1996) states that “learning is not all in a student’s head; their body plays an important role, too” (p. 68). Convinced that improvements in attention and learning were due to physical movement Hannaford took a closer look at the body’s role
in thinking and learning. What Hannaford discovered was that after implementing certain brain based movements, such as the exercises of Brain Gym, she saw considerable improvements in students' learning. What causes such results? Why is there a seemingly direct link between the body's movement and learning and focus?

**Brain Gym**

Brain Gym is a program of exercises that can potentially impact students' attention and ability to focus and retain information. They are simple and enjoyable movements to enhance whole brain learning (Dennison & Dennison, 1986). They are intended to be easy and comfortable and in no way a diagnosis for any ailment. They are simply skills that can be used to enhance students' learning (Dennison & Dennison, 1994).

The program was developed by Paul Dennison in order to help him deal with his own dyslexia and is now being used in schools worldwide (Hannaford, 1996). Brain Gym was developed in order to stimulate, release, or relax students' involved in particular types of learning situations (Dennison & Dennison, 1994). Dennison’s and Dennison’s thinking was that since each side of the brain operates the opposite side of the body, the two sides of the brain are forced to communicate when legs and arms are being moved and crossed over the central part of our body (Pierson, 2002). Most of Brain Gym’s exercises involve the participant crossing his/her arms or legs across his/her body; activating the brain through these movements lead to a high probability that the movements will also affect learning.

Brain Gym is meant to be performed for a time period of two to five minutes before certain skills are to be taught. The program targets topics such as: reading,
thinking, writing, and self-awareness as appropriate learning activities before which Brain Gym should be implemented (Dennison & Dennison, 1994). For each area, certain exercises are suggested to be used in order to bring out the full potential of the students. Freeman-Koestar (2000) is another leading expert on Brain Gym and suggests that Brain Gym should be performed for fifteen minutes spread out over the course of the day.

Through Brain Gym, students are able to access parts of the brain previously inaccessible. Allowing children to move in the classroom in a positive manner will unfold their unique and complete intelligence so that they will not be blocked, but free to learn (Dennison & Dennison, 1994).

The Dennison’s believe that Brain Gym truly benefits the students. It teaches re-patterning procedures that are recommended for anyone who wants to improve the quality of his or her living and learning. It gives students the opportunity to use movement during the school day to help them re-focus and learn. According to these researchers, after using Brain Gym, changes in student learning and behavior are often immediate and profound.

Freeman-Koestar (2000) believes that the benefits of Brain Gym go beyond learning and behavior improvements and not only improves students’ self esteem but results in a calmer classroom climate.

Some researchers do not necessarily agree with the Dennisons and Brain Gym. Templeton and Jensen (1996) suggested that the most visible benefit of Brain Gym was that it merely allowed the students opportunities to move. In their traditional classroom, students were expected to be still and not given the opportunity to move until Brain Gym
was implemented. In this type of motionless atmosphere, the classroom climate turned to a disruptive environment (Templeton & Jensen, 1996).

Templeton and Jensen (1996) also make the statement that Brain Gym gives the students a sense of hope, a way of improving their grades and behavior. This could be a false hope for students who require more than just movement to re-focus their attention on a skill.

Hendy (2000) suggests that Brain Gym is not the only alternative to get children moving. Playgrounds can be an important release of energy as well. An exciting outdoor experience provides students with a creative space for them to develop their own types of movements (Hendy, 2000).

Does Brain Gym benefit a student’s ability to focus and at the same time improve learning? Researchers have found connections between the development of gross and fine motor movement and the demonstration of attention behaviors in classrooms. Yet, there is no conclusive, widely accepted evidence that movement based strategies such as Brain Gym can improve learning and attention to a significant degree.

Summary

There are many factors that exist for why children are sometimes unable to sit still and pay attention during school. Motor skills are often a contributing factor. If a child has a delay in a fine or gross motor skill it could affect the way that child pays attention. This delay could be of no fault of the child, he/she is just not developmentally ready to sit still and pay attention as he/she is expected to do in a traditional school setting. The question is how to help these children overcome this overwhelming sensation to voluntary or involuntarily move?
Brain Gym is a program that could potentially impact students’ ability to refocus and retain information. It claims that through specific movements children are able to access certain parts of the brain that were previously inaccessible (Dennison and Dennison, 1994). According to the Dennisons, after using Brain Gym changes in student learning and behavior were seen (1994).

Other supporters of the Brain Gym program are Templeton and Jensen (1996) who feel that Brain Gym gives the students a sense of hope. “Almost all students … believed in the benefits of Brain Gym exercises,” (p. 11).

However, there are researchers who suggest that Brain Gym is not the only option for a problem of lack of attention. Hendy (2000) believes that other, simpler forms of energy release would be effective, such as the playground.

Even though there are supporters of the Brain Gym program there is still no conclusive, widely accepted evidence that movement based strategies such as Brain Gym can improve learning and attention to a significant degree, which leads to the desire of generating more research to learn more about how Brain Gym affects different settings.
Chapter III

Data Collection Techniques

Purpose

Students, even young students, must be able to demonstrate focused, sustained attention during math time in order to achieve district and state standards. This can prove sometimes difficult for many young students for various reasons; one reason being motor development delays. Research suggests that using a program of physical activities that enhances learning ability in children could lead to greater attention spans. One such program is Brain Gym. Brain Gym is a series of exercises that can potentially impact students’ attention and ability to retain information. It has been used in several settings with mixed results.

Statement of Question

The purpose of this study is to answer the question: Does Brain Gym, a program of exercises that can potentially impact students’ attention and ability to focus and retain information, affect 1st grade students’ behavior and achievement in math?

Subjects

The researcher is an intern teacher at an urban school in Western New York. This elementary school is considered a high need school and serves a multicultural group of predominately low socioeconomic students in Pre-K through grade five.

The classroom in which the research was conducted was a first grade of twenty-one students. Of these students, fourteen were male and seven were female. This group consisted of students from Hispanic (43%) and African American (57%) backgrounds. Each of the students receives free breakfast and free lunch.
Some of the students in the classroom received special help for their academic and developmental needs. Two students were pulled out of the classroom for language help because English is their second language. Two other students received speech help and three students worked with the occupational therapist. Two students have Individualized Education Plans (IEP). One has an IEP for speech and the second has it for other health impairments, which include high lead levels. Three other students were in the process of being labeled and are currently in the Education Support Services stage.

Research Design

The researcher followed all required steps in preparation for data collection. A research training course required by SUNY Brockport and conducted by the college’s Internal Review Board (IRB) was completed (See Appendix A). A proposal was submitted to the graduate school for research with human subjects (See Appendix B). Next, literature review was conducted to collect background information on the implementation of Brain Gym in other settings, to summarize findings from previous research studies, and to determine sub-questions that would guide data collection for this study. School administration and parental approval was sought (See Appendices C & D). Upon approval, the researcher began gathering baseline data to describe students’ behavior and math achievement prior to the implementation of the Brain Gym program. In order to create background knowledge of the children’s math achievement and behavior different data techniques were used. One such technique was field notes. The researcher was able to carefully observe the students’ during math lessons and begin to build an understanding of the way each of the children responded to math.
Checking for understanding and unit tests were other techniques utilized in the process of gathering baseline data. Through these methods the researcher was able to collect student artifacts that provided an example of student comprehension.

After baseline data had been collected for five weeks, Brain Gym was introduced and implemented to the entire class. When the students were first exposed to Brain Gym they were hesitant because it was something new that they had never tried before. The first exercise that was introduced to them was called Neck Rolls, a simple and painless stretch. The students stood with their hands on their hips and rotated their head one-hundred and eighty degrees in a repetitive motion (Dennison and Dennison, 1994). For the next three months each math lesson began with a Brain Gym exercise. For two to five minutes before a math lesson all students would either participate in Neck Rolls, the Elephant, or the Owl. Neck Rolls were meant to relax the neck and release tensions resulting from an inability to cross the visual midline (Dennison and Dennison, 1994). The Elephant was meant to activate the inner ear to improve balance and also to relax the neck muscles, which often tense in reaction to excessive lip movement during silent reading (Dennison and Dennison, 1994). To perform the Elephant the students would extend one arm and rotate that arm in circular motions (Dennison and Dennison, 1994). The Owl also is meant to release neck and shoulder tension and increase circulation of blood to the brain (Dennison and Dennison, 1994). To perform the Owl the students would place head on one shoulder and then place one hand on the opposite shoulder that the head is on and gently press down on that shoulder (Dennison and Dennison, 1994).

Although the entire class would participate in Brain Gym activities, six students were chosen based on the information collected through the various data collection
techniques to be the focus subjects for the duration of Brain Gym. They were observed throughout the study and in order to triangulate findings the researcher collected different sets of data. Check lists were used in order to compile information on an individual’s behavioral and academic achievement (See Appendices P & Q). Observations were made to help complete the Behavior Chart. The researcher was watching to see if the students were following the designated criteria; sitting still, maintaining eye contact, and participating appropriately. Every five minutes for the entire thirty minute math lesson the researcher would indicate on the chart if the student was following the criteria by placing a “+” indicating that the student was achieving that behavior or a “0” indicating the student was not achieving that behavior.

To collect data on academic achievement the informal assessment of checking for understanding was used (See Appendices E, F, G, H: these are examples of sorting buttons). Also see Appendices I, J, K, L (these are examples of fill in 100’s chart). Formal assessments in the form of end of unit tests (See Appendix M, this is one example of the three end of unit tests that were given throughout this study), were used at the end of each unit. Throughout this study, three units were covered during the math lessons and three end of unit tests were given. The collection of this type of data was helpful in order to provide insight into each student’s understanding of the material.
Data Matrix

<table>
<thead>
<tr>
<th>Questions/ Focus</th>
<th>Data Source #1: Check Lists</th>
<th>Data Source #2: End of class Checking for Understanding</th>
<th>Data Source #3: End of Unit Tests</th>
<th>Data Source #4: Field Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior: Is the student sitting still, using eye contact, and participating appropriately?</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Achievement: Is the student improving his/her grades after the implementation of Brain Gym?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Data Analysis

All of the information collected for this study was completed and reviewed by this researcher. Triangulation of data was utilized in this research in order to increase the validity of findings (Hubbard & Power, 2003). Students’ comments during math class were immediately recorded in writing. All student comments were recorded using the verbatim principle, which is scribing exactly, word for word, what the student stated (Hubbard & Power, 2003).

The behavioral and academic achievement checklists, end of class checking for understandings, and end of unit tests were all thoughtfully reviewed for trends and anomalies. To collect data on both academic achievement and behavior, field notes were utilized (See Appendices N & O). These notes helped the researcher formulate thoughts.
After reviewing the data, generalizations were then developed to describe how the use of Brain Gym impacted first grade students’ attention and achievement in math class in one urban classroom.

Brain Gym was conducted in a classroom and the exercises involved all students. However, data was collected and analyzed on only six of these students. Findings cannot be generalized to other settings or students, but can be used to create a deeper understanding of the impact of programs such as Brain Gym in school settings.
Chapter IV

Findings

Introduction

Throughout the process of this study, the researcher collected data from a variety of sources including: check lists, end of class check for understanding, end of unit tests, field notes, and photography. The purpose of collecting this data was to answer the question: Does Brain Gym, a program of exercises that can potentially impact students’ attention and ability to focus and retain information, affect 1st grade students’ behavior and achievement in math?

The researcher began reviewing the data once all collecting had ended. Upon evaluating the information the researcher made generalizations based on what was found. The following are these generalizations.

Generalizations

Generalization 1: Students who participated regularly in Brain Gym had higher achievement levels in end of unit tests, however these students also had higher overall school attendance rates.

Looking at Graph 1, which is a representation of all six subjects’ attendance during the Brain Gym study, it can be seen that Student D had perfect attendance throughout the study. Looking at Graph 2, which is a representation of Student D’s and Student E’s results from the three end of unit assessments, it can be seen that Student D increased his score on end of unit assessments from the first to the third assessment. Could Student D’s perfect attendance during Brain Gym have been a contributing factor to the increase?
Similarly to Student D, Student E attended school 92% of the time while the Brain Gym study was being conducted and increased her end of unit assessment score steadily over the three assessments of understanding. Could Brain Gym again be a contributing factor to the increase?

Looking at Graph 1, Student C only attended school 89% of the time while the Brain Gym study was being conducted. Noting that and then looking at Graph 3, Student C’s second assessment received a zero because he was not present the day the assessment was given. Although make-up assessments were given at a later date, it still seemed as thought Student C could have done better if he had consistency in his attendance.

Although there is not a huge gap between 89% and 92% there is still a gap. And Student E, being in school 92% of the time while the Brain Gym study was being conducted, did in fact have a greater improvement in her assessments.

Graph 4 represents Student A’s and Student B’s scores on each of their three end of unit assessments. Student A experienced a slight increase in scores while Student B experienced an increase on assessment two and a decrease on assessment three.

School attendance may be the important factor in Student D and Student E increasing their scores on end of unit assessments. This could be assumed based on the information in Graph 1, Graph 2, Graph 3, and Graph 4.
Graph 1

Attendance During Brain Gym Study

Graph 2

End of Unit Assessments
Graph 3

End of Unit Assessments

Percentage Earned

Assessments

Student C

Student F

Graph 4

End of Unit Assessments

Percentage Earned

Assessments

Student A

Student B

Generalization 2: Student understanding of mathematical concepts increased from the time Brain Gym was implemented to the time the post study analysis was conducted.

At the beginning of first grade, STAR Math Diagnostic Reports were completed on each student. These reports were helpful in determining the level of understanding for each student. The STAR Math program is conducted on the computer where the student answers different types of math questions. The answers the student gives are then analyzed by the computer and a print out of the results is given. On this print out, the
student is given a Grade Equivalent (GE) score, which informs the teacher of student performance level.

Graph 5 is a representation of the selected six students Grade Equivalent score. STAR Math was conducted on these students in September before Brain Gym was implemented and in March during the post Brain Gym analysis. All six students either improved their Grade Equivalent score or it stayed at the same level.

This graph shows that in September, before Brain Gym was implemented, five of the six students were working well below the first grade level. Also from this graph it is certain that after the March assessment and the Brain Gym study was completed that five of the six students were working at the first grade math level. In fact, two students were working above the first grade math level. For these students, based on this data, Brain Gym had a positive affect on these students therefore increasing their Grade Equivalent score.

It seems as though Brain Gym had the most impact on the low students. These are the ones who were identified in the review of literature as having movement problems and would in fact benefit the most from a program such as Brain Gym where physical activities are being utilized.
Generalization 3: An improvement in student behavior was seen after the implementation of Brain Gym.

When Brain Gym was first implemented, the six students who were selected to be observed did not display all three criteria for good behavior. The three characteristics for good behavior throughout this study were: sitting still, maintaining eye contact, and participating appropriately during math time. However, each student began showing signs of improvement over the three month period that Brain Gym was conducted in the classroom. For example, at the beginning of the study Student B had trouble participating appropriately according to the guidelines set in place (See Appendix R). Towards the end of the study Student B showed improvement in his behavior, based on the Behavior Charts, leading to the conclusion that Brain Gym helped this student behavior appropriately during math (See Appendix S).

Student D displayed inappropriate behavior at the beginning of the Brain Gym study (See Appendix T). All three criteria: sitting still, maintaining eye contact, and participating appropriately, were difficult for this student to achieve. At the end of the
Brain Gym study significant improvements were made in behavior by Student D as seen on his check list (See Appendix U).

Based on the information from the check lists, it could be assumed that Brain Gym was a contributing fact in helping Student B and Student D meet the criteria for good behavior.

*Generalization 4: Students genuinely liked the Brain Gym activities.*

Based on the field notes the researcher collected during the Brain Gym study, it could be concluded that the selected six students enjoyed using Brain Gym before math time. Indications that the students were enjoying themselves were noted based on the expressions that the students shared. When the teacher would announce that it was time to do Brain Gym the students would make comments such as, “Yes” and “I like doing Brain Gym.” Along with the positive comments about Brain Gym, these exercises also signified that math was about to start. Comments such as, “That means it’s math time” were heard during Brain Gym activities. Not only were these students happy to be performing the Brain Gym activities but they were also now beginning to be excited about math time.
Chapter V
Implications

Introduction

After generalizations were made from the data that was collected during the Brain Gym study, the researcher was able to create implications surrounding the research question. These implications are based on the information that was collected throughout the study. The sources that were used to collect this information included: check lists, end of class checking for understandings, end of unit tests, field notes, and photography.

Implications

• Gross and fine motor skills are important skills that have an impact on a student’s ability.
• Movement can be an important factor that could possibly contribute to a student’s improved learning.
• Brain Gym is a successful program that consists of simple and pleasurable movements that helps improve student behavior and increases academic achievement.
• Student attendance could be a contributing factor that could possibly impact a student’s ability to learning.

Questions for Further Research

• Do 1st grade math students enjoy using Brain Gym before math lessons?
• Does Brain Gym have an effect on the behavior and academic achievement of students if it is performed before science or another subject area?
• If Brain Gym is conducted in a classroom from the beginning of the year to the end of the year would there be greater improvement in academic achievement and behavior?

• How would Brain Gym compare to another form of physical movement? Would this other form of physical movement impact students’ behavior and academic achievement?

• Would the students’ behavior and academic achievement improve if they were allowed to create and implement their own Brain Gym activity?

• If Brain Gym was introduced to an older age group would there be different results in academic achievement, behavior, and feelings towards the program?

• If a classroom studied the same material but half of the students were exposed to Brain Gym and the other half was not, the control group, would there be any significant differences between the two group’s academic achievement and behavior?
CITI Modules

CITI Course in The Protection of Human Research Subjects

Friday, August 26, 2005

CITI Course Completion Record
for Beth Ramsperger

To whom it may concern:

On 8/26/2005, Beth Ramsperger (username=earamsperger0033) completed all CITI Program requirements for the Basic CITI Course in The Protection of Human Research Subjects.

Learner Institution: College at Brockport

Learner Group: Group .2

Learner Group Description: This Group is appropriate for faculty, staff, graduate students and undergraduate students completing thesis or independent study projects. In addition to the required modules, complete any of the following modules applicable to your research:

- research with prisoners,
- Research with children,
- Research in public and elementary schools,
- International research,
- Internet research.

Questions? Send an email to the institutional coordinator at cdonalds@brockport.edu

Contact Information:
- Gender: Female
- Department: Education
- Which course do you plan to take?: Social & Behavioral Investigator Course Only
- Role in human subjects research: OTHER
- Email: earamsperger0033@yahoo.com
- Office Phone: 585-749-1972

The Required Modules for Group .2 are:

Date completed

29
Introduction 08/25/05
History and Ethical Principles - SBR 08/25/05
Defining Research with Human Subjects - SBR 08/25/05
The Regulations and The Social and Behavioral Sciences - SBR 08/25/05
Assessing Risk in Social and Behavioral Sciences - SBR 08/25/05
Informed Consent - SBR 08/26/05
Privacy and Confidentiality - SBR 08/26/05
SUNY College at Brockport 08/26/05

Additional optional modules completed: Date completed

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator
1) The objective of this research is to see if Brain Gym, a program of exercises that can potentially impact students' attention and ability to focus and retain information, can affect 1st grade students' behavior and achievement in math.

Students who have difficulty focusing on math also have difficulty retraining information and building skills. The purpose of this research is to explore whether adding a brief period of Brain Gym exercises to the morning routine prior to math will have an affect on students' on-task behavior and engagement, and therefore impact achievement in math.

Research will be conducted in three different segments. The first segment will be a 2 week long period to observe the students' during math before Brain Gym is implemented.

The second segment will be introducing Brain Gym the entire class and implementing it. This segment will last three months and the students will participate in Brain Gym activities before each math lesson.

The last segment in this process will be a post Brain Gym assessment. During this time Brain Gym will continue but the researcher will be looking for signs of improvement, both behaviorally and achievement wise. This will last two weeks.

In order to assess students' behavior and achievement two different resource sheets will be utilized.

2 & 3) Twenty-one students will be participating in Brain Gym but only six students will be observed and assessed on their behavior and achievement using the two different resource sheets. These six students will be chosen using a stratified random sampling procedure; two high achieving math students, two average achieving math students, and two struggling math students, at random and will not be aware that they have been chosen. Two students from each the high, middle, and low achievement area will be chosen.

4) N/A

5) N/A
6) The expected start date for this research will begin upon approval from Institutional Review Board. The completion date for the project will depend upon the start date, but no later than June, 2006.

7) Attached are copies of the two different resource sheets that will be utilized throughout the research process.

8) Attached is a copy of my completion of the online training course.

9) Twenty-one students will be participating in Brain Gym but only six students will be observed and assessed on their behavior and achievement using the two different resource sheets. These six students’ will be chosen using a stratified random sampling procedure; two high achieving math students, two average achieving math students, and two struggling math students. In order to guard their confidentiality codes will be used in place of student names.

10) Attached is a copy of informed consent.

11) Attached is a copy of permission to conduct this research.

12) N/A
Rochester City School District

To Whom It May Concern:

I have read the following research proposal and give my permission for the research to be done at School #25 pending approval by the Human Subjects Committee at SUNY Brockport.

Proposal Title:
The Affects of Movement on 1st Graders' Behavior and Achievement in Math.

Researcher:
Elizabeth A. Ramsperger

Signature of Principal/Assistant Principal
Dear Parent(s) and/or Guardian,

Beginning soon our 1st grade class will be doing exercises before math that will last approximately five minutes. We call these exercises Brain Gym because it gets our minds ready for math. Brain Gym is a simple and enjoyable way to make learning easier. It has been used in many classrooms all over the United States to help students focus and be more attentive during seat work.

While we use Brain Gym in our classroom, I would like to observe students’ performance in math to see if the brief exercises help them focus and maintain attention for longer periods of time. I would like to use these observations as a part of my Masters research project at SUNY Brockport. No child’s name will be used in this process, and no math activities or grades in math will be affected by your child’s participation. However, I do need your permission to include observations of your child’s attention during math following the Brain Gym exercises.

Please return the bottom portion of this form to school with your child if you agree to let me record observations of his/her attention level in math to see if children are more attentive after exercise. Thank you for your support.

Sincerely,

Miss. Ramsperger

I have read this letter and agree to let my child’s performance in math be evaluated for Miss. Ramsperger’s research.

________________________________________
Child’s Name

________________________________________
Parent(s) and/or Guardian Signature
Appendices F, G, and H are samples of just one of the many checking for understandings that were conducted throughout the Brain Gym study.

This checking for understanding was based on an activity for sorting. The objective was for the students to take a pile of 20 or so buttons and sort them into two different piles. The ways they sort the buttons were entirely up to the individual student. The purpose of this checking for understanding was to see if the students were able to apply their knowledge of how to sort and be able to use that knowledge to sort buttons.
I sort through buttons by color.
Appendices J, K, and L are samples of just one of the many checking for understandings that were conducted throughout the Brain Gym study.

This checking for understanding was based on an activity of counting to the number 100. The purpose of this checking for understanding was to see if the students could apply their knowledge of how to count to 100 and use that knowledge to help them fill in the blank numbers on a 100’s chart up to 100.
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</table>
Name: ____________________________________________

Date: ____________________________________________

Math Assessment

Place Value:

1. _____ tens

2. _____ tens
3. ____ tens

4. ____ tens
Quick Images
Write the number you think is the Quick Image you see.

5. __________

6. __________

7. __________

8. __________

Skip Counting
9. Continue with the next number

_____________   _______________   _______________
10. Draw more counters so that you have 13 in all.
Observations during Brain Gym

Student A = • a look of grimace
  • neck rolls don't appear to hurt him
  • "this hurts"
  ➲ I tell him to stop but when he sees other students enjoying he continues his neck rolls with a smile

Student C = • large smile
  • chatting with neighbor but continues with exercise.
  • appears to be enjoying movements

Whole Class = I asked if everyone enjoyed using Brain Gym and the student response was a overwhelming yes! (Some thumbs up too!)
Observations during math!

Student B:  
- so quiet today
- her personality is quiet
- which makes it hard
- for her to participate
- sometimes
- eye contact good!

Student F:  
- quiet
- raises hand rarely today
- only participates when called on
Behavior Chart

Two "low" math students, two "middle" math students, and two "high" students were chosen to be observed throughout the research process.

Each math lesson will last 30 minutes. The students will be observed five times (every five minutes) during the lesson. They will be observed for the following criteria; sitting still, eye contact, and appropriate participation. A (+) indicates meeting criteria and a (0) indicates not meeting criteria.

<table>
<thead>
<tr>
<th>Student: ___________________</th>
<th>Status: ___________________</th>
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<tbody>
<tr>
<td><strong>Sitting Still</strong></td>
<td>1&lt;sup&gt;st&lt;/sup&gt; 5 minutes</td>
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<tr>
<td><strong>Eye Contact</strong></td>
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<tr>
<td><strong>Appropriate Participation</strong></td>
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</table>
Academic Achievement Chart

Two “low” math students, two “middle” math students, and two “high” students were chosen to be observed throughout the research process. Each math lesson will last 30 minutes. The students will be assessed at the end of each lesson. Assessments will be one question to be answered orally or in writing based on the lesson objective. If the student understood the concept being taught they will receive a three, if they partially understood the concept they will receive a two, and if they had no understanding of the concept, they will receive a one.

<table>
<thead>
<tr>
<th>Student</th>
<th>“Status”</th>
<th>Academic Achievement</th>
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<tbody>
<tr>
<td>A</td>
<td>Low</td>
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<td>B</td>
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<td>C</td>
<td>Middle</td>
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<tr>
<td>D</td>
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<td>E</td>
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<tr>
<td>F</td>
<td>High</td>
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**Behavior Chart**

Two "low" math students, two "middle" math students, and two "high" students were chosen to be observed throughout the research process. Each math lesson will last 30 minutes. The students will be observed five times (every five minutes) during the lesson. They will be observed for the following criteria: sitting still, eye contact, and appropriate participation. A (+) indicates meeting criteria and a (0) indicates not meeting criteria.

**Student:** B  
**Status:** "low"

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<th>1&lt;sup&gt;st&lt;/sup&gt; 5 minutes</th>
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<th>4&lt;sup&gt;th&lt;/sup&gt; 5 minutes</th>
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<td>Sitting Still</td>
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<tr>
<td>Appropriate Participation</td>
<td>0</td>
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Behavior Chart

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Each math lesson will last 30 minutes. The students will be observed five times (every five minutes) during the lesson. They will be observed for the following criteria; sitting still, eye contact, and appropriate participation. A (+) indicates meeting criteria and a (0) indicates not meeting criteria.

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<th>Student:</th>
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<th>Status:</th>
<th>“Low”</th>
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<td>Appropriate Participation</td>
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Behavior Chart

Two "low" math students, two "middle" math students, and two "high" students were chosen to be observed throughout the research process.

Each math lesson will last 30 minutes. The students will be observed five times (every five minutes) during the lesson. They will be observed for the following criteria; sitting still, eye contact, and appropriate participation. A (+) indicates meeting criteria and a (0) indicates not meeting criteria.

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<tr>
<th>Student: D</th>
<th>Status: &quot;middle&quot;</th>
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<tr>
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<th>1&lt;sup&gt;st&lt;/sup&gt; 5 minutes</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; 5 minutes</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; 5 minutes</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; 5 minutes</th>
<th>5&lt;sup&gt;th&lt;/sup&gt; 5 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting Still</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Eye Contact</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Appropriate Participation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Appendix U

Date: ____________________

Behavior Chart

Two “low” math students, two “middle” math students, and two “high” students were chosen to be observed throughout the research process.

Each math lesson will last 30 minutes. The students will be observed five times (every five minutes) during the lesson. They will be observed for the following criteria; sitting still, eye contact, and appropriate participation. A (+) indicates meeting criteria and a (0) indicates not meeting criteria.

<table>
<thead>
<tr>
<th>Student: D</th>
<th>Status: middle</th>
</tr>
</thead>
</table>

<table>
<thead>
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<th>2&lt;sup&gt;nd&lt;/sup&gt; 5 minutes</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; 5 minutes</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; 5 minutes</th>
<th>5&lt;sup&gt;th&lt;/sup&gt; 5 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting Still</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Eye Contact</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Appropriate Participation</td>
<td>0</td>
<td>+</td>
<td>+</td>
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References


