

RUNNING HEAD: Movement in the Classroom

THE EFFECT OF MOVEMENT ON COGNITION AND BRAIN FUNCTIONING IN THE
CLASSROOM

By

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ABSTRACT

This study was conducted to find out if there is significant difference between including movement in instruction and not including movement in instruction. Differences in teaching styles and students with varying learning needs should be considered when determining instructional methods. Research supports that movement should be including in instruction to increase student achievement. Findings of this study show that students who receive movement incorporated into their instruction are outperforming students whose instruction does not include movement. The study was conducted using two first grade classrooms. Each class was taught multiple spelling lessons; one class using movement in the instruction and the other using more traditional instructional methods. At the end of the unit, a post-test was administered to the students, and a t-test was used to analyze the results.

INTRODUCTION

Background, issues, and concerns

Some classroom teachers still employ the practice of students being in their desks all day and the teacher standing at the front of the room talking at the students. After they have finished talking, they then have the student complete a worksheet to show what they learned. For most students, this is not the way they learn best. It is concerning that some teachers do not use what has been identified as best practice in education. Many students need bodily kinesthetic activities incorporated into their day to help them learn best, but this is not always being implemented.

Practice under investigation

The practice under investigation is looking at including movement in instruction to improve brain functioning and achievement. There will be an investigation to see if there is significant difference between students who receive instruction that includes movement and those students whose instruction does not include movement.

School policy to be informed by study

Because all students are required to pass the state reading, writing, math, and science standardized tests, instruction should be varied to help maximize student success. If significant increases in scores occur, teachers should continue to add more movement into the school day to help increase memory and cognition.

Conceptual underpinning

Based on Howard Gardner's theory of multiple intelligences, there are several different learning styles that people learn best through. These include linguistic, logical-mathematical, music, spatial, naturalistic, interpersonal, intrapersonal, and bodily kinesthetic. Based on this theory incorporating movement into the classroom should help many students who learn best

through bodily kinesthetic activities improve their achievement. “Exercise creates the optimal environment for neural plasticity, the ability of the brain to change.” (Blaydes, 2000, p. 1) Because exercise helps change the brain, new brain cells are formed and connections are made stronger. When someone is physically active, more parts of the brain “light up” or are used. (Blaydes, 2000, p. 1) This allows the brain to remember more because different areas of the brain were functioning while learning was taking place.

Statement of the problem

If there is a significant difference between including movement and not including movement, teachers should be incorporating more movement into their instruction. Some teachers are not incorporating movement into their instruction to help the students who learn best kinesthetically.

Purpose of the study

The purpose of this study is to collect data to find out the answer to the research question, and to see if movement in the classroom will increase a student’s achievement.

Research question

Is there a significant difference in achievement between students who have frequent movement in their instruction and students who do not?

Null Hypothesis

There is no significant difference in achievement between students who have frequent movement in their instruction and students who do not have frequent movement in their instruction.

Anticipated Benefits of the Study

Gaining insight into whether incorporating more movement into lessons is beneficial or not is an anticipated benefit of this study. In working with students with special needs, teachers are always looking for interventions to help them improve and keep their skills. Finding out if movement does or does not benefit the students in their academic setting will help both teachers and students.

Definition of Terms

Kinesthetic: Learning through using the body and movement.

ADHD: Attention deficit hyperactive disorder

ELL: English language learners

Procedural memory: Unconscious memory of skills and knowing how to do things

Summary

A study was conducted on the effect of incorporating movement into instruction in the classroom. The study focused on incorporating movement versus not having movement in the lessons. If t-test results indicate that there was a significant difference, movement should be incorporated into instruction more often. Since there are many benefits to moving other than cognition and memory, movement should be incorporated. Also, since many students are bodily kinesthetic learners, it will be important to offer movement as a way to help them learn the material.

REVIEW OF LITERATURE

First Lady Michelle Obama stated "The physical and emotional health of an entire generation and the economic health and security of our nation is at stake" when she was speaking during the launch of Let's Move! initiative (Let's Move!, 2010, p. 1). This initiative encourages all Americans, especially our youth, to get at least 60 minutes of physical activity each day. With this emphasis on physical education there will be effects on students' mental and physical wellbeing. The question must be asked, how are they connected?

"Bringing movement into the classroom by integrating it into academic subjects can benefit students' minds and bodies." (Reilly, 2012, p. 66) There are many benefits of moving, and these benefits can be integrated into the traditional academic setting. When a person is moving, many parts of the brain are actively used (Blaydes, 2000). The challenge for teachers then becomes how to bring more movement into traditional lessons to increase the amount of brain being used.

Teachers will resist this change. It is hard enough to teach algebra, let alone incorporate physical activity into the lessons. Moreover the challenge of space becomes an issue. Class sizes continue to rise while the amount of physical space stays the same. Teachers believe that if they let go of the reigns, their classroom will become chaotic and discipline will be compromised.

There are many physical benefits of exercise and movement. Movement "promotes biological changes in the brain that enhance adaptability and connections between brain cells; this brain activity is necessary for learning as well as for the growth of new brain cells." (Reilly, 2010, p. 63) These changes in the brain are necessary for learning to take place. Jensen (2000) states, "Movement increases heart rate and circulation which often increase performance." (p. 34).

It is necessary for students to move. For students' brains to "function optimally and to do their best academically, children generally need regular activity periods." (Reilly, 2000, p. 63) "When students are inactive for periods longer than 20 minutes they experience a drop in glucose and oxygen to the brain, resulting in diminished ability to focus, comprehend, and remember." (Reilly, 2000, p. 63) Jensen (2000) also tells of the negative effects of sitting all day. "The typical student who sits much of the day runs the following risks: poor breathing, strained spinal column and lower back nerves, poor eyesight, and overall body fatigue." (p. 35)

Tate (2010), author of "Worksheets Don't Grow Dendrites: 20 Instructional Strategies That Engage the Brain," also speaks of the effects of movement on memory. She states "When there is a brain-body connection, memory is enhanced." (p. 70). Procedural memory is enhanced when physical movement is involved. Procedural memory is the strongest of all the different types of memory. This is the memory that is used to ride a bike or tie a shoe. "Repeat a movement often enough and that movement becomes a permanent memory" (Tate, 2010, p. 71) Using movement in the classroom has many positive effects.

Movement has a significant impact on student achievement. According to Bladyes, (2000) author of "How Exercise Benefits the Brain," academic performances are improved in the areas of reading, reading comprehension, and math. She also states improved creativity, focus, and problem-solving skills come from movement and exercise. Colleges are encouraging students to have this level of success. Admissions officials want students to who are successful on the fields and courts of competition as well as in the labs and classrooms of academia.

Movement appeals to students at all academic levels. Gifted students accept the challenges of strategy, students with ADHD are able to move without getting into trouble, and ELL students are exposed to new vocabulary and language through interaction with their peers.

Kinesthetic activities like physically making groups to demonstrate multiplication, jumping jacks after reciting sight words, and Kagan's (2009). StandUp-HandUp-PairUp can be used to help students increase their achievement. These exciting ways of learning demand the attention of all types of learners therefore growing their abilities.

“Teachers can rev up their students’ brain function and reduce off-task behavior by incorporating simple activities into the regular school day.” (Reilly, 2010, p. 64) From the physical effects of increased circulation and brain functioning to the decreased behaviors of students with behavior disorders, movement improves achievement for all students.

RESEARCH METHODS

Research Design

A quantitative study was conducted to see if there is a difference between students who receive instruction with movement and without movement. The independent variable was the groups that receive movement. The dependent variable was the student's achievement. If a significant difference is found between the groups, teachers should be informed and movement should be incorporated more frequently in the classroom.

Study Group Description

The study group for this research consisted of two classes of 14-19 students. One class received movement in their classroom. The other class did not receive movement in the lessons that were taught to them. The students used in the study were from a variety of backgrounds. Of the thirty-three students who were used in the study, there were sixteen girls and seventeen boys. Three of the students receive special education services and eleven students receive ESL services. Several ethnic groups were represented in the group of students. These include Caucasian, three students; African American, eighteen students; Asian (Karen and Burmese), eight students; and Hispanic, four students. 88% of the students receive free or reduced lunch.

Data Collection and Instrumentation

Pre-tests and post-tests were used with each group in the study. All students were presented with the pre-test. After the pre-test was administered, instruction was provided to students. Students in one class received instruction with movement incorporated and students in the other class did not. At the end of the unit of instruction, the post-test was administered. Scores were analyzed to see the effect of movement on achievement. Data from the post-test was

used to determine if there was a significant difference between receiving movement and not receiving movement.

Statistical Analysis Methods

A t-test was calculated using A Statistical Package (ASP) software to determine if there was a significant difference between achievement of the students who received movement in their instruction and those students who did not receive movement in their instruction. The results were broken into two categories: movement and no movement. The mean, mean D, t-test, df, and p-value were concluded from this test. The Alpha level was set at 0.25 to test the null hypothesis: There is no difference in achievement of students who receive movement in their instruction and those who do not receive movement in their instruction.

FINDINGS

A t-test was conducted to conclude whether there was a difference in performance on classroom test performance based on movement in instruction. The following tables, graphs, and charts will depict the organized findings based on the statistical raw data taken in two first grade classrooms in Omaha, Nebraska.

Figure 1

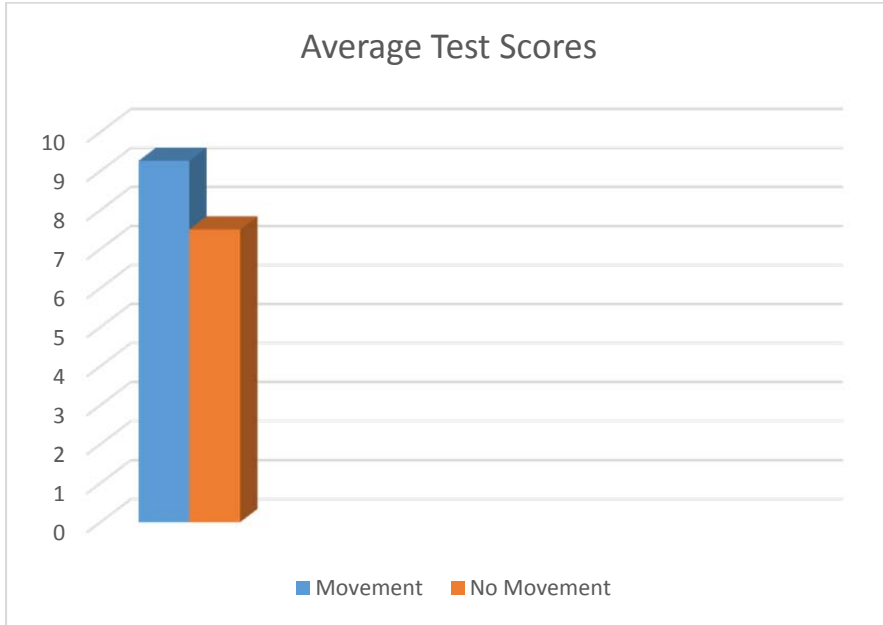
t-Test Analysis Results for Use of Movement and Test Achievement

Source	Mean	Mean D	<i>t</i> -test	df	<i>p</i> -value
Movement	9.26				
No Movement	7.50	1.76	2.67	31	0.12

Note: Significant when $p \leq 0.25$

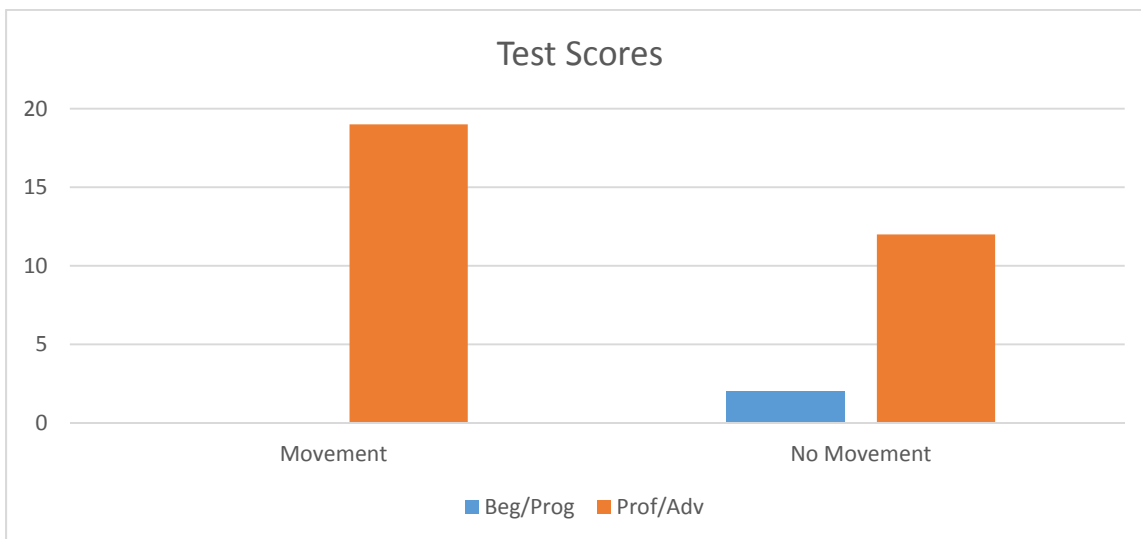
Thirty-three first grade students were selected for a study to determine if movement in the classroom effects classroom performance. A test of ten questions was administered to these students. In the classroom that including frequent movement, the mean score was 9.26. The mean score for students who did not receive frequent movement in their instruction was 7.50. The Mean D, or the difference between the two classrooms, was 1.76. The t-test result was 2.67 and the df was 31. The null hypothesis states that there is no significant difference in brain functioning and achievement between students who have frequent movement and students who do not have frequent movement. The null hypothesis is rejected because there is significant difference between the students who received movement in their instruction and those who did not.

Figure 2



The mean score for students in the classroom which included movement in the lessons was 9.26. This mean was 1.76 points over the classroom which did not use movement in the classroom. The bar graph above shows the difference in the performances of the two classrooms.

Figure 3



There are four categories that a student's grade can fall into. The four categories are beginning, progressing, proficient, and advanced. Figure 3 shows the distribution of scores in the

two classrooms. 100% of the students in the classroom with movement in their instruction performed on or above grade level on their tests. 85.71% of students in the classroom where movement was not included in instruction performed on or above grade level. As is visible in the graph, students in the classroom which movement was included in instruction were more likely to perform better on their test.

CONCLUSIONS AND RECOMMENDATIONS

Based on the current findings and outcomes, students who receive movement incorporated into their instruction perform better in an academic setting. The findings show that there is a significant difference between the performance of students whose instruction includes movement and those students whose instruction does not include movement. T-test results from a test given to first graders shows a result of 2.67. The p-value of the t-test is 0.12, therefore resulting in a rejection of the null hypothesis. This then shows there is a difference between the performances of students who do and do not receive movement incorporated in their instruction.

These research findings are strongly supported by the conceptual underpinnings of the theories of Howard Gardner. There are many different ways that students learn. Bodily kinesthetic is one of the ways children learn best and this is supported by the research findings. There are many benefits to students having movement incorporated into their instruction. These benefits outweigh the negatives of movement incorporation.

There are other studies that could be done based on this study. This study was done for one subject, with one set of information. Another study could be done to see movements effect on performance in other academic areas including math, science, social studies, and language arts. Another study could also be conducted to see if the information has made it to the student's long-term memory. These studies could be expanded district, state, or nationwide.

Professional development is an essential part of education. Incorporating professional development on the importance of using movement, as well as data results will help teachers to be better prepared to incorporate movement into their lessons. Professional development using data results will help teachers see the benefits of using movement. Giving teachers this information will help the teachers have more confidence when using movement in their lessons.

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