

The Effects of Guided Dancing Movement Breaks on
First Graders' Addition and Subtraction Computational Skills

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Abstract

The purpose of the study was to investigate the impact of guided dance movement activities on first grade students' addition and subtraction computational skills. The study took place over the course of six weeks and used a pre-test and post-test design. For the first three weeks, students in the study participated in a guided dance movement activity, lasting approximately 10 minutes, prior to an addition and subtraction computation lesson. During the last three weeks, students in the study were not provided a guided dance movement activity prior to the computation lesson. The students were assessed on their addition and subtraction computation skills after the first three weeks, and again at the end of the study, by using an Anne Arundel County provided Quick Check Assessment. The results show the second quick check, after no movement treatment, there was not a statistically significant difference. Future studies are recommended involving two groups of study participants, one receiving the guided dance movement treatment and one without, in order to determine the effects of guided dance movement activities on students' computational skills.

CHAPTER I

INTRODUCTION

Overview

Movement, of any degree, in the classroom is vital to all children's overall health and academics. When children are provided with the opportunity to get out of their seats and move around, or move their bodies, they are improving their health, are more engaged and motivated to want to learn, can focus better, and improve their academics. According to Miller and Lindt (2018), "Movement integration is an interdisciplinary method of teaching that may lead to greater student outcomes and long-term knowledge acquisition" (p. 31). Movement in the classroom can be simple or complex, depending on the age of the students, the physical ability of the students, the teacher's level of comfort with incorporating movement into lessons, and the materials available.

Brain Breaks are a very popular way to integrate movement into daily lessons or schedules. Researchers, Perera, Frei, Frei, and Bobe (2015), found that using Brain Breaks in the classroom requires no additional equipment and they can be performed in the classroom or any other existing facilities. These researchers go on to add, "Brain Breaks uses simple, safe movements, storylines, music and creative background to engage the students on multiple sensory levels" (p. 61). Movement in the classroom can also involve having the students use flexible seating, such as stability balls, to complete their work. Students are required to use their core muscles in order to sit and balance on the stability ball, which in turn, provides their bodies with small movements as they focus and learn.

Allowing students to complete activities which have them moving around the room, such as a Write the Room or a Mathematics SCOOT, allows the students to not only complete a task, but to do so while moving around the classroom space.

When students are more physically active, their brains become healthier, which is why movement in the classroom is very important to students' brain and physical health. According to Chaddock-Heyman, Erickson, Kienzler, King, Pontifex, Raine, Hillman, and Kramer (2015), "Higher levels of aerobic fitness are also known to predict better academic performance (e.g., mathematics, reading, English) during childhood, and significant improvements in scholastic performance are associated with increased participation in physical activity during the school day" (p. 2). When students are provided with movement opportunities, not only are they getting more physically active and healthy, but the students' brains become stronger. These researchers, state that aerobic fitness is associated with specific measures of brain health and cognition during child development, therefore individual differences in aerobic fitness are associated with cortical thickness, which would in turn be related to academic performance. Movement in the classroom also promotes a positive learning environment for students and impacts positive student behavior. When students can participate in a movement activity or break between lessons, the students are more on-task, engaged in the lesson, and motivated to want to learn. Studies show that student behavior improves when they are provided with an opportunity to move or "get their wiggles out" during or after instruction.

According to researchers Miller and Lindt (2018), movement activities in the classroom can positively influence students' learning and retention of strategies and facts in mathematics. Studies performed by these two researchers show that students who were provided academic lessons that combined physical activities with academic content scored better on mathematics

assessments because they had more retention of skills and concepts than students who were not provided with lessons involving physical activities. Since physical movement is associated and promotes brain health, students tend to score better on assessments and retain information more easily when they are physically active during instruction. A study performed by Chaddock-Heyman et al. (2015) determined that "...individual differences in aerobic fitness play a role in childhood cortical gray matter structure important for scholastic success, particularly on mathematics tests" (p. 7). These researchers also go on to state that, another study showed specific effects of aerobic exercise training on mathematics achievement, with no benefit to reading, in a sample that was performed on children between the ages of seven and eleven.

The type of movement in classrooms that promotes mathematics achievement does not have to be all physical movement. A study performed by researchers Mead, Scibora, Gardner, and Dunn (2016) suggests that students who sit on stability balls, as a means of improving student learning and physical activity, tend to score higher in mathematics and on mathematics assessments than those who did not use the stability balls. Physical activity and movement of any type promotes academic achievement in students of all ages.

The type of movement intervention used for this study was guided dance movement activities on www.GoNoodle.com and through YouTube.com. Both websites offer guided dance movement routines that require the students to follow along and dance/move their bodies in order to match the people or characters on the screen. The guided dance movement activities will be selected because of student participation interest and the variation of styles of physical activities the students choose to do each day. The students will choose one-to-three guided dance movement activities each day during the first three weeks of the study (during the movement intervention treatment) amounting to ten minutes total each day. These movement interventions

have been popular with the participating students so far this school year when doing brain breaks, therefore, they will continue to be utilized for this study.

Statement of the Problem

The purpose of the study was to investigate the impact of guided dance movement activities on first grade students' addition and subtraction computational skills.

Hypothesis

The null hypothesis is that the use of classroom guided dance movement activities prior to first grade math instruction will have no effect on computation.

Operational Definitions

- ***Guided Dance Movement.*** The guided dance movement activity varied each day, but all activities required the students to follow along to a dance that involved them moving their bodies and allowing their brains to take a break from academics. The guided dance movement activities were all taken from either GoNoodle.com or Just Dance through YouTube. The guided dance movement activities involved students jumping, dancing, clapping, stomping, and moving around in their “brain break spot”.
- ***Computation.*** The students' scores from the addition and subtraction computation assessment given to them after the guided dance movement activity treatment occurred. Another computation assessment was given to the students three weeks after the guided dance movement activity treatment ended. The addition and subtraction computation assessments were all taken from the Anne Arundel County First Grade Mathematics Curriculum. The three addition and subtraction computation assessments (the pre-test given prior to the movement treatment beginning, the assessment given after the movement treatment occurred, and the assessment given three weeks after the movement

treatment ended) were all different but still assessed the students on addition and subtraction computation with sums and differences of 1-20.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review examines how movement in classrooms is not only healthy and engaging for students, but it can also improve their academic achievement and success. Section one identifies the impact physical activity in the classroom has on student overall health. Section two identifies the impact of physical activity on student academic achievement. Section three describes ways that teachers can use movement breaks in their own classroom. Section four is a summary of the literature and the relationship of the literature to this research study.

Impact of Physical Activity on Students' Overall Health

According to the Centers for Disease Control (CDC), twenty-seven percent of the nation is inactive, meaning there is no reported activity in their daily lifestyle (Adams-Blair & Oliver, 2011). Having a sedentary lifestyle and no physical activity is linked to numerous health problems and concerns, such as being overweight and obese, having a greater risk for developing heart disease later in life, and certain cancers. Although these health problems and concerns are found in adulthood, it is very important to take action when children are young in order to prevent them from being unhealthy later in life.

In most of elementary schools today, children engaged in physical activity and education a maximum of twice of week, which is far less than the CDC recommends for the week. Some schools do not provide students with the opportunity to become physically active during the day since there is too much concern that the physical activity is taking away from the academic instruction. According to Bailey and DiPerna (2015), approximately 50% of children do not have much of a chance of achieving the minimum recommended physical activity level without daily physical activity during normal school hours. When children are inactive, they often become

overweight or obese, and then may encounter and struggle with poor body image, low self-esteem, low self-concept, and emotional disorders. According to Adams-Blair and Oliver (2011), “Studies show that at least 70% of overweight children will become overweight adults” (p.148). It is very important that children of all ages maintain a physically active lifestyle so they can grow to be successful and healthy adults.

Watson, Timperio, Brown, Best, and Hesketh (2017) find that many physical and mental health benefits can be achieved when children participate in the recommended 60 minutes per day of moderate to vigorous-intensity physical activity. When students are physically active, they are not only becoming physically healthy, but they also are strengthening their brain and improving their memory, cognitive control, and academic achievement. According to Chaddock-Heyman, Erickson, Kienzler, King, Pontifex, Raine, Hillman, and Kramer (2015), “Higher levels of aerobic fitness during childhood are associated with superior cognitive control, memory, and academic achievement. Growing evidence suggests that these aerobic fitness differences in cognition and academics have a biological basis in the brain” (p. 1).

When children are physically active, they are not only becoming more physically fit, but also mentally fit. The brain benefits significantly when children are physically active. Children who are more physically fit than their peers are found to have larger structural brain volumes in the hippocampus and dorsal striatum, which are two subcortical regions in the brain critical for memory and learning. These physically fit children also have more efficient brain activation patterns during attentional and interference control tasks than their lower fit peers.

When students are more physically active, they often perform better in school. According to Watson et al., (2017), there is increasing interest from researchers and educational

professionals on the potential for classroom-based physical activities to positively impact academic-related outcomes, including classroom behavior, cognitive function, and academic achievement in school aged children. Chaddock-Heyman et al. (2015) also state that, “Higher levels of aerobic fitness are also known to predict better academic performance (e.g., mathematics, reading, English) during childhood, and significant improvements in scholastic performance are associated with increased participation in physical activity during the school day” (p. 2). In other words, students who are physically fit and who have higher levels of aerobic activity in their daily lives typically perform better in school academically than their less active peers.

When students are not physically fit or active, it often becomes harder for them to do many things. Studies show that children in today’s world are less active than in the past. Adams-Blair and Oliver (2011) find that on average, children ages 8-18 spend over seven hours per day using entertainment media, watching TV, or playing video and computer games. It is important to note, however, that this statistic does account for all children, those inactive and those who are physically active. When children become overweight or obese, they often have more trouble doing many things that their active peers can do. For example, children who spend their free time being sedentary, would have a harder time playing a game of tag or soccer. These children also tend to have a harder time performing academically in school. Inactive or non-physically fit children also have a harder time burning off the calories they eat, which results in them becoming overweight. Bailey and DiPerna (2015) find that children with sedentary lifestyles, combined with an overly high intake of calories from unhealthy foods, result in an excessive energy balance for children and weight gain overtime. These children are not allowing the

energy they get from their foods to be burned off, which results in them becoming overweight or obese at a young age.

Impact of Physical Activity on Students' Academic Achievement

When children and students are actively engaged in any type of physical activity, they become more engaged in lessons and more motivated to want to learn. Students also become more focused on instruction and tend to perform better academically when physical activity or movement breaks are incorporated in their daily schedule and lessons. Researchers, Chandler and Tricot (2015) explain that numerous students have shown that body movements during instruction can have substantive positive effects on the children's' cognition, learning, and academic achievement. When children feel they are taking a break from learning to perform an engaging and motivating movement for a physical activity break, they often tend to become excited and motivated to learn. Benes, Finn, Sullivan, and Yan (2016) concluded from their recent study that "Many teachers discussed that students enjoy moving in the classroom and that movement increases students' engagement with their academic content...They also felt that movement helps refocus students and students enjoy using movement in the classroom" (p. 121). The more students are able to move around and stay active in the classroom, the more successful they tend to be.

In a recent study on the Encouraging Activity to Simulate Young (EASY) Minds, Riley, Lubans, Holmes, and Morgan (2014) find that children displayed significantly greater on-task behavior during the intervention period when the students were moving around the room during instruction in mathematics. In another recent study, it was concluded that physical activity in schools improves students' concentration, students' energy level, and even their peer interactions

(Perera, et al., 2015). Overall, students are more engaged, motivated, and focused on instruction when physical activity or movement breaks are involved in their school day.

Student mathematics scores and achievement are often significantly impacted by physical activity and movement breaks. Research from the study done by Mead, et al.,(2016), indicate that incorporating certain types of exercise during math instruction can positively impact standardized test scores. Students who are actively engaged in movement or physical activities tend to learn more and be more academically successful in mathematics.

According to Miller and Lindt (2018), “...movement activities in the classroom can positively influence children’s learning in math and retention in spelling” (p. 33). In a recent study done by researchers Chandler and Tricot (2015), it was found that whole-body physical exercise has underlying effects on cognition because “...physical activity causes physiological changes, such as increased cerebral blood flow, increased blood flow, increased oxygen levels to areas of the brain that support memory and learning and release neurotrophins that enhance neuronal processes in the brain which benefit cognitive performance, especially executive functions” (p. 367). In other words, when students are physically active, they are powering up their brains to help them stay focused, self-monitor their work, and be able to recall things easily. These skills are needed to be successful academically and can help students recall their mathematics facts and problem solving skills/strategies, as well as stay focused on instruction and self-monitor.

According to Chaddock-Heyman et al. (2015), past research studies have shown that physical activity and movement in schools has been found to relate to both English/reading and mathematics achievement. Another study identified by the same researchers has shown specific

effects of aerobic exercise and movement training on mathematics achievement from a sample of 7-11 year old children.

In a recent study on the use of stability balls in the classroom, researchers Mead et al. (2016) find that stability ball use may be a simple, yet effective means of improving student learning of mathematics. In this study, the students' chairs were replaced with stability balls, which resulted in improved student standardized test scores in math. The positive effects that physical activity and movement has on student achievement in mathematics is proof that students of all ages should be given the opportunity to participate in some type of movement break or physical activity throughout the day, especially right before or during academic instruction.

How Teachers Can Use Movement Breaks in Their Classroom

Providing students with the opportunity to participate in a movement break, or brain break, throughout the day is key to helping students stay physically active and promotes academic achievement. According to Perea et al. (2015), "In the U.S., it is common that blocks of instruction are taught consecutively without breaks, which is challenging for classroom teachers and students alike and may contribute to 'burn out'" (p. 61). This idea is surprising considering the research that proves movement in the classroom has significant positive effects on student motivation, engagement, and academic achievement. Many teachers are nervous at first to incorporate Brain Breaks, or movement breaks, in their classroom for fear that the students will miss out on instructional time. However, studies and research show the positive effects that movement and physical activity has on student physical and mental health, as well as on their academic achievement and learning.

According to Benes et al. (2016), "Schools should be considered as one of the main institutions for addressing physical inactivity not only because of the amount of time spent at

school and the influence schools can have on student development, but also because of the increased amounts of research that suggest physical activity can have positive benefits on academic outcomes” (p. 112). This research goes on to state how classroom teachers are critical stakeholders in increasing the physical activity in students at school. Bringing teachers on board with physical activity and movement in the classroom is essential and can promote academic success, as well as physical and mental health for students.

Teachers can easily incorporate brain breaks into their classroom through a variety of ways. Perea et al. (2015) state in their research article, that Brain Breaks require little to no additional equipment and these movement activities can be performed in the classroom or other existing facilities in the school. The researchers go on to say that “Brain Breaks uses simple, safe movements, storylines, music and creative backgrounds to engage the students on multiple sensory levels” (p. 61). Teachers can use Brain Breaks between lessons, at the start or end of the day, or really at any point in their daily schedule where they feel their students would benefit from getting out of their seats and moving their bodies around.

Another easy and beneficial addition to any classroom wanting to promote physical activity in students is the use of stability balls. In a recent study done by researchers Mead et al. (2016), the use of stability balls in a classroom study was found to be “...more effective in influencing academic performance because the stability balls resulted in greater alertness and arousal during academic instruction than intermittent bouts of activity or no physical activity at all” (p. 444). In this study, students who sat on stability balls were more attentive to instruction, which resulted in greater gains on test scores.

According to Camahalan and Ipock (2015), ideas for incorporating physical or movement activity breaks into the daily school day are endless. Teachers can use wake-up activities at the

start of the day, desk side breaks, jogging behind their seats, Simon Says, guided dancing videos on the computer, stretching, calisthenics, movement games, etc. The researchers go on to say, “The more creative we [the teachers] are, the better the chances are that our instruction will stick with the students past the classroom” (p. 292). Students also tend to become calmer and more prepared to learn once their bodies get a chance to move around. Further, the researchers find that giving students the opportunity to get up and move during the movement break resulted in students becoming calmer and their bodies being rested as they worked through the problems in mathematics. Teachers can easily incorporate movement and Brain Breaks into their lessons and daily schedule in order to enhance their instruction and promote physical activity and movement in their classroom.

Summary

Physical activity and movement breaks in the classroom have significant positive effects on the academic achievement of students. When students participate in physical activity or movement breaks, they are becoming both mentally and physically healthier. Aerobic fitness improves brain health, which promotes cognitive control, memory, and academic achievement. When students are physically active, they have less of a chance of becoming overweight or obese, and are less likely to develop heart disease, or other health concerns later in life. Physical activity and movement breaks in the classroom also promote academic achievement, motivation, and engagement in the classroom. Studies show students often perform better academically when movement or physical activity is combined into their daily schedule and instruction. Teachers can easily incorporate movement or physical activity into their lessons in a variety of ways to make the learning more meaningful and beneficial to students.

This literature review focuses and examines the positive effects of physical activity in classrooms, and how movement is not only healthy and engaging for students but can also improve their academic achievement and success. In this research study, first grade students will be participating in guided dancing movement activities (GoNoodle, YouTube, Just Dance, etc.) to determine if there is a positive correlation between physical/movement activities and the students' achievement in addition and subtraction computational skills.

CHAPTER III

METHODS

Design

The purpose of the study was to investigate the impact of guided dance movement activities on first grade students' addition and subtraction computational skills. This is a quasi-experimental study using a single group of the same students who were not randomly selected. The study uses pre-and post-assessments and guided dance movement activities. The independent variable for this study was the classroom guided dance movement activities the students participated in each day prior to math instruction. The dependent variable in this study was the students' scores from the addition and subtraction computation assessment given to them after the guided dance movement activity treatment occurred. Another computation assessment was given to the students three weeks after the guided dance movement activity treatment ended. The addition and subtraction computation assessments were all taken from the Anne Arundel County First Grade Mathematics Curriculum. The comparison of the students' scores from the addition and subtraction computation assessment after the guided dance movement activity treatment and the computation assessment three weeks after the guided dance movement activity treatment ended was made to determine if the null hypothesis could be supported.

Participants

This study was conducted at a Title 1 elementary school in Anne Arundel County Public Schools. During the 2017-2018 school year, there were approximately 846 students enrolled in the school. Of these students, 231 were African American, 270 were White, 55 were considered to be of more than one race, 224 were Hispanic, 54 were Asian, and fewer than 10 students were Hawaiian/Pacific Islander or American Indian. The school has a large percentage of FARMS students due to the school being a Title 1 school. There are many students who receive Special

Education Services, as well as many English Language Learners who receive English Language services.

According to the Maryland Report Card from the Maryland Department of Education, this school received three out of five stars and was thirteenth in the Elementary Percentile Rank for the 2017-2018 school year. The school earned 38.7 (45%) out of 85.0 possible points for Overall School Performance. The academic achievement of the students at Marley Elementary is on the lower end of the scale. During the 2017-2018 school year, 3rd-5th grade students who took the Mathematics and Language Arts State Assessments earned 7.9 points out of a total of 20 possible points on the Academic Achievement Indicator. This indicator is a combination of the percent of students who scored proficient or higher on the state assessments, as well as the average performance level of students on the state assessments.

This study was conducted in a First-Grade classroom. There were 23 students in the class, with students ranging in academic level. There were two students who have IEP's for speech, and 1 student who received English Language Services. Of these 23 students, ten of them were said to be white, ten students were African American, one student was Hispanic, and two students were considered to be more than one race. There were also nine students who were FARMS students, in which they received free and reduced meals during the school year.

Academically, the First-Grade students who participated in this study all had a strong foundation of number sense and could rote count from 1-100. The students in the study all received the same mathematics instruction adapted from the Anne Arundel County First Grade curriculum. All the students had been instructed previously on simple computation strategies, and all students had a background of adding and subtracting numbers. Of the 23 students in the study, five of them received Title 1 Services for mathematics instruction. These five students

were pulled three times a week, for approximately 30 minutes, to receive extra support in mathematics.

Instrument

The study used three instruments, including a computational pre-test given prior to the movement treatment occurring, a quick check assessment given three weeks after the movement began, and then another quick check assessment three weeks after the movement ended. All three instruments were provided and developed through the Anne Arundel County Mathematics Curriculum. The pre-test and two quick check assessments all required the students to add and subtract numbers from 1-20 using any known strategy. These assessment instruments were all accessible through Blackboard, the Anne Arundel County online curriculum site. Each of the assessments were graded on students' computation accuracy and showed their ability to correctly add and subtract.

Procedures

Prior to the movement treatment occurring, the first-grade students were assessed on their addition and subtraction computation skills. The students took a computation pre-assessment, which showed their ability to fluently add and subtract numbers from 1-20. This pre-assessment provided the researcher with baseline data for each student in the study group. Each day for a period of three weeks, amounting to fifteen school days, guided dance movement activities were built into a 10-minute block from 10:30-10:45am. The guided dance movement activities included dance videos from GoNoodle.com and YouTube.com. Both websites provided the students with various guided dance movement routines that required the students to follow along

and dance/move their bodies. The guided dance movement activities were selected because of student participation interest and the variation of styles of physical activities.

Each day after the guided dance movement activity, the participants were instructed in mathematics, and always began with a quick computation lesson/warm-up. After the three-week movement treatment occurred, the participants were given a computation quick check assessment to assess their ability to fluently add and subtract numbers 1-20. During the following three weeks, a total of another fifteen school days, the guided dance movement activities ended, but the participants were still instructed in mathematics, which began with a computation lesson. After these three weeks, the participants were given another quick check computation assessment to see their ability to fluently add and subtract numbers 1-20. This was the last and final quick check computation assessment that participants took. The results of the last computation quick check assessment were used to investigate the impact of guided dance movement activities on first grade students' addition and subtraction computational skills.

CHAPTER IV

RESULTS

The purpose of the study was to investigate the impact of guided dance movement activities on first grade students' addition and subtraction computational skills.

The addition and subtraction pre-test and two quick check assessment scores were analyzed for first graders after guided dance movement before instruction using a *t* test for paired subjects. The results are presented in Table 1 below.

Table 1

Pre-and-Post-test Addition and Subtraction Scores After Guided Dance Movement

Intervention

Test	Mean	N	Standard Deviation	<i>t</i>	Significance
Pre	6.2	21	2.05	0.00	1.00
QC1	6.2	21	2.02		
P	6.2	21	2.05	1.07	0.30
QC2	6.7	21	1.65		
QC1	6.2	21	2.02	1.29	0.21
QC2	6.7	21	1.65		

The null hypothesis that the use of classroom guided dance movement activities prior to first grade math instruction will have no effect on computation is accepted.

CHAPTER V

DISCUSSION

Results

The results from this research study show the scores from the pre-test assessment before the movement treatment and the first quick check after the movement treatment were the same. This shows that the students scored similarly on their pre-test and the first quick check. The results data also show the second quick check, after no movement treatment, had no statistically significant differences.

Implications

Movement in the classroom, of any kind, is very important to students' physical, mental, and emotional health. It also is known to help improve students' academics and provide them a better chance for academic success in the classroom. When students get their bodies and minds moving, they are also improving their behavior because they are allowing their bodies to get their "wiggles" out before attending to their academics.

During the research study, the researcher took away the guided dance movement treatment for the last three weeks of the study so that it could be seen if the movement had any impact on the students' addition and subtraction computational skills. During these three weeks, the students' behavior was more negative, and many students had a hard time sitting still during math instruction. The students were much more fidgety and had a tough time attending to their work since they were not given the chance to do a guided dance movement activity, as normally in our schedule at that time. The students also begged and asked to do the guided dance movement break later in the day, since they do enjoy getting the opportunity to have these brain breaks.

The guided dance movement treatment that occurred in the classroom was movement videos from GoNoodle and Just Dance on YouTube. Both types of guided dance movement breaks allow the students to follow along to a scripted dance video in which the students are moving their arms, legs, and whole body to a song. The videos all show people or characters doing the dance on the screen, and the students follow along either from the carpet or from behind their desks. The students become very engaged in these types of guided dance movement activity because they feel they are the characters on the screen and enjoy following along to the videos. The songs are also popular songs that the students hear on the radio, so they enjoy singing along as well. The students tend to perform better after participating in a guided dance movement activity.

Threats to Validity

The threats to validity that occurred during the research study are as follows:

- There was no control or comparison group.
- The students' maturity level increased as the research study was conducted, which could have resulted in the students performing better on the second quick check since they were more mature, and not because of the influence of the guided dance movement activities.
- When the research study began, the current math topic was geometry. During the last three weeks of the study, we had switched to focusing on numbers and computation.

Comparison of Results to the Literature

The results of the research study compare to other research studies found in literature because many previous studies involving movement in the classroom show positive results on students' academic and educational success. Research from the study done by Mead, et al., (2016), indicate that incorporating certain types of exercise during math instruction can

positively impact standardized test scores. In the research study, the students' addition and subtraction computational scores were impacted by guided dance movement activities.

Studies performed by Chaddock-Heyman et al. (2015) have shown that physical activity and movement in schools has been found to relate to both English/reading and mathematics achievement. These studies also involve students performing physical activities and movement in the classroom, which resulted in mathematics achievement for the students.

In another recent study on Encouraging Activity to Simulate Young (EASY) Minds, Riley, Lubans, Holmes, and Morgan (2014) found that children displayed significantly greater on-task behavior during the intervention period when the students were moving around the room during instruction in mathematics. The researcher found similar results to this research because the student sample performed better behavior and attention-wise when they were given the opportunity to perform a guided dance movement activity. They were more focused, more engaged, and less fidgety once they participated in the movement. According to Miller and Lindt (2018), "...movement activities in the classroom can positively influence children's learning in math and retention in spelling" (p. 33). Literature from past research studies involving movement in the classroom show similar results on the positive effects that movement has on students' academic success.

Future Research

If the researcher were to repeat this study again with another group or class of students, several elements would be changed. First, the researcher would have broken the class into two different groups; one who received the guided dance movement treatment, and one that did not. This would have allowed the researcher to have a control group of students and to not have to take the movement activity away from the whole class, but rather just the one group of students.

Another element the researcher would change with the study would be to plan the study around the same time that teaching addition and subtraction computation was occurring. During this study, the class switched math topics from geometry to computation of numbers, which may have caused a threat to the validity of the study and results.

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