

The Effects of Brain Breaks in a Classroom

by

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Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Education

May 2019

Goucher College
Graduate Programs in Education

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Abstract

The purpose of this study was to determine whether using brain breaks in a classroom would improve students' test scores. The measurement tool was summative assessments. This study involved use of a posttest design to measure the data collected from the assessments to determine how brain breaks impacted test scores. It was proven that there was no correlation between brain breaks and achievement in test scores. Although the subjects noted that they had a pleasant experience participating in the brain breaks. Research in this area should look deeper into student demographics, population, and grade level as to what type of brain break should be offered in the classroom.

CHAPTER I

INTRODUCTION

Even though many schools as early as kindergarten have become training grounds for students to learn and sit quietly, research has shown in developmental science and cognitive neuroscience that active play and movement are at the heart of children's learning. A child's ability to learn depends on whether they can allocate and sustain focused attention but sitting still is not the way that deep attention and learning emerge (Ostroff, 2014).

Unfortunately, in many of today's high schools, students sit through a 90-minute class period with only a slight chance of getting out of their seat and moving around. The school that is being used for this research contains classes students to sit in their seats for the entire period. Typically, students are not up and moving. When there is some type of movement or break involved in the class, it's noted that attitudes adjust, and their engagement and effort increase which leads to passing grades. But when students sit for the class period it leads to inattention, distraction, and not enough effort being put in their work which leads to incomplete or failed assignments

Students need some type of break implemented in the middle of a long class period to help them refurbish their brain power, relax themselves if they are struggling on a question or assignment, refocus their attention, and be able to complete and pass all their assignments throughout the entire class period.

Researchers have stated that using movement breaks in the classroom can have a great impact on the engagement of the students, and that sacrificing small amounts of physical activity breaks in a class period seem to improve the attentiveness of students. In a classroom with activity/movement breaks students need to get out of their seats to stay actively engaged

(Camahalan & Ipolk, 2015). With these students the researcher believes this break is surely needed to help increase their focus and improve their grades for all assignments and tasks.

Allowing the use of brain breaks, movement breaks, or any break in the academic classroom would train the student and teacher on a good time to take the break if frustration or off-task behavior is occurring. Taking a break during class this would let the students be more aware of themselves about when to ask for one if the teacher doesn't notice they need one which would might, in turn, carry over to state assessments. Any break would allow them to refocus and complete their assessment to the best of their ability, especially with a refreshed focused mind.

Statement of the Problem

Many high school students have difficulty sitting in their seats for 90 minutes and maintaining their focus, remaining on task, and meeting academic standards. This can lead to students becoming frustrated, demonstrating increasingly inappropriate behavior, and distracting other students in the class. The purpose of this study is to evaluate the effectiveness of movement/brain breaks. The goal for the intervention is to enable students to maintain focus, deescalate themselves if they are frustrated with a problem, and complete all the tasks at hand. The research question is whether students who receive movement/brain breaks will achieve higher on unit tests in the Learning About Children class, than students who do not receive breaks.

Statement of Research Hypothesis

The null hypothesis is that there will be no significant difference in unit test scores of students who receive movement/brain breaks in a 90-minute class period and a control group that does not receive these breaks classroom.

Operational Definitions

Movement/Brain Breaks – Classroom-based physical activities for students to get the moving more. The breaks will contain stretching and breathing exercises, as well as small cardio that the students can do standing at their seats. Movement allows them to refocus or get their “wiggles” out but energizes them and gives them a chance to increase their focus for the next activity or task.

Unit Test – A test containing multiple choice, short answer, true and false as well as short essay questions that covers an entire unit on Parenting Styles, which is completed in the Learning About Children curriculum.

Learning About Children Class – A class in the Family and Consumer Science Department which contains students who are in the Early Childhood Education pathway.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review explores the benefits of movement and physical activity breaks in a classroom setting. The first part of this review will cover teachers' perspectives on breaks in the classroom setting and whether they think they are needed. The second part consists of the research into brain breaks. The third section focuses on brain breaks in today's classroom and what physical activity can do to help a student's achievement.

Introduction

Many students are sedentary for long periods throughout the school day only to have breaks during class change or use the bathroom. Most high schools are on a block schedule where they are in a class period for a total of 90 minutes. Four consecutive periods of that can really take a toll on someone who may already have a problem with sitting still or staying focused. Many schools are resorting to brain breaks/movement breaks during the class period to give the students a few minutes to stand up and get their blood flowing. Studies show that this is beneficial to schools as well as students' focus and achievement.

Teachers' Perspectives on Brain Breaks

Even though students are in the driver's seat when it comes to their education, the teachers are the conductors shouting, "All aboard" from the side of the train, hoping that everyone gets on. Some students have school come easy to them. They can remain focused and driven, completing assignments with ease and receiving good marks on assessments. Other students struggle with school, with staying on task, and with completing what is asked of them. There are many reasons for this, but what if focus and giving the brain a chance to stop and take a break could be a positive solution to this problem?

This is where brain breaks come into the picture. Especially for upper grades where recess is something of the past, there are very few chances for physical activity during a school day. Gym classes are offered as an elective, but in Maryland high schools, students only need one credit of physical education classes in their entire high school career. Many of them opt out of taking gym after their required one credit. Unfortunately, adolescents today are living a more sedentary lifestyle, spending hours upon hours at home in front of television or other electronic devices. This is where the schools can help with the problem. As Dinkel, Schaffer, Snyder, and Lee (2017) point out, “Schools can serve as prime opportunities to improve children’s PA because the vast majority of children attend (97%) and spend a large amount of time in schools, 6 or more hours/day, 180 days/year” (p. 187). Schools cannot force students to take gym class or sign up for a sport, but they can include some sort of physical activity opportunities in their classroom settings by way of brain breaks. Not only can these breaks help with the students’ physical activity quota, it may also help increase on-task behaviors and academic outcomes.

Many teachers are open to the idea of brain breaks and seek professional development on how to utilize them the best ways in their classrooms. However, at the same time there are some barriers that force teachers to push brain breaks to the back burner. Due to testing and accountability pressures in schools, many teachers have felt then need to increase focus on academic opportunities in a school day. Other problems can arise. For one, there is limited time in a class period with certain curriculum that needs to be covered. Also, a lack of materials or space in a classroom, or even classroom control and behavior problems can hinder the implementation of brain breaks. Teachers may fear that opening the door to students getting out of their seats and moving around may just cause chaos. Some fear that they won’t be able to bring the class back to their seats and return to the assignment. Teachers also may have lack of

information on how to properly implement these breaks. They may not fully know how brain breaks work and how to use them, so they just stay away from the idea or have a negative attitude (Dinkel et al., 2017).

Even with these barriers, the good outweighs the bad when it comes to physical activity breaks in a classroom for teachers. There are numerous studies that are discussed in part two of the literary review that show the multiple benefits. What teacher wouldn't want to have a classroom of students who are engaged and focused? Many students may be labeled as having ADHD and have problems sitting still and may be antsy and disengaged. One valid issue is that the rise in students with ADHD directly corresponds with a decline in recess time (Ostroff, 2014). Keeping students away from exercise can cause problems in classrooms. Incorporating breaks may "scratch the itch" of students with attention issues and give them a chance to recharge and regain focus on the academic task. Teachers can create a classroom atmosphere where students are able to release energy to become more engaged in their learning (Camahalan & Ipolk, 2015).

In conclusion, teachers may be willing to utilize physical activity in the classroom, but they need to have proper training and education on how to correctly use brain breaks. A paradigm shift regarding attention may be needed from a passive to an active model.

Research on Brain Breaks

Janssen et al. (2014) conducted a study in which the goal was gain a better understanding of the effects of a short physical activity in primary aged schoolchildren and its effects on their selective attention. This study observed 123 participants from four different schools who were all in the fifth grade. In one week, researchers observed the students participate in a 15-minute activity every day after completing one hour of schoolwork. Everyone was split up randomly

into four different groups; the first was no break, the second was a passive break where they didn't perform hard tasks or physical activity, the third was an exercise break consisting of moderate physical activity, and the fourth was an exercise break consisting of vigorous activity. Before participants took part in their activity, they were pretested on their selective attention with a task as well as at the end of their activity with the same posttest.

Janssen et al. (2014) concluded that selective attention, one of the executive functions of cognitive performance, significantly improved in 10- and 11-year-old children after a 15-minute exercise break. They found that after students participated in a moderate intensity physical activity break there was a great amount of improvement in their selective attention. The passive break also positively affected students' attention. There wasn't a mention of the type of break that was used but the study seemed to use a break falling between the moderate and passive level. The findings from this study indicate to schools and teachers that implementing physical activity during the school day may help students' selective attention and improve academic performance. One strength of this article was that the children acted as their own controls. They were the ones who defined how much effort they put into their activity break they were assigned to if assigned to one. No one told them to do anything, and they participated in the activity on their own. This gave them a sense of ownership which can lead to a better participation rate.

Another study was that done on effects of movement breaks in the class by Howie, Beets, and Pate (2014) set out to prove that on-task behavior correlates to how students perform academically. This study aimed to compare the effects of five, ten, and twenty minutes of classroom exercise and how exercise relates to on-task behavior. Ninety-four participants in the fourth and fifth grade, from 9-12 years of age, were grouped based on academic abilities and interests. In a four-week period, students participated in two days of classroom exercise breaks

per week while time on task data was collected only once a week. All the observations were held on the same time and day of the week for each classroom group. The researches were looking for an improvement of the student's time on task behaviors. There were four different conditions when testing the participants of the study. The first was a ten-minute seated classroom activity, the second was a five-minute classroom break exercise activity, the third was a ten-minute classroom exercise break, and the fourth was a 20-minute classroom exercise break. The exercises ranged from moderate to vigorous depending on which group students were placed in. Before, during, and after the condition taking place, all the information gathered was from direct observation and recordings of each day, measuring time on and off task and work being completed.

From this study, researchers concluded that implementing exercise breaks into the academic classroom will improve the on-task behavior of the fourth and fifth graders. Time on-task was significantly higher in students after ten minutes of classroom exercise breaks compared to sedentary attention control (Howie et al., 2014). Ten minutes of exercise was the perfect amount to implement into the classroom which overall improved the on-task behavior in children and also improved their academic performance in the classroom. In this article, one of the main purposes was to expand and continue the research on physical activity and on- and off-task behavior. This study found a great deal of information relating the two.

Carolson et al. (2015) conducted a study on whether student physical activity and classroom behavior are associated with one another. These researchers consider this topic understudied and felt that many schools are providing insufficient physical activity opportunities. With the background information they were collecting, they wanted to determine whether effective real-world interventions worked on students' physical activity and behavior. Surveys

were given to teachers to fill out on behaviors exhibited before and after the intervention was been implemented. The participants in this study ranged from first through sixth grade and were comprised of students from six different districts. Throughout the entire school year based on the location of the school district, a physical activity plan was created and implemented every day for ten minutes. Teachers were given the opportunity to fill out a survey after the intervention was implemented for a week on the behaviors that were being shown in class. Teachers were also sent training videos with tips and advice of the physical activity breaks, so students would be getting the correct instruction while taking their break. In this study observers came to the different schools in the school districts randomly to collect more data on the intervention.

One major conclusion that Carlson et al. (2015) reached from this study is that, when teachers implemented physical activity breaks in their classroom, there was an increase in physical activity during school, increased on-task behavior, and attentive behavior in the classroom. When teachers are supported in implementing this strategy into their classroom or into the entire school, students can receive the amount of physical activity they should be getting in a day. As such, there is also an improvement of students' behavior and focus. Overall, every students' performance in the classroom showed improvement after these physical activity breaks were implemented.

Wilson, Olds, Lushington, Petkov, and Dollman (2015) studied the impact of a brief physical activity outside the classroom on boys' attention and on-task behavior in the classroom setting. Since there is a great deal of research focused on physical activity and the benefit it has on children, researchers wanted to gather more information on whether physical activity impacted cognitive development in students. The researchers believed that boys are more prone

to inattention than girls. They sampled 58 boys who were 10-11 years old in elementary school. This test was completed three out of the five days of the week, once per day, for four weeks. The type of activity lasted about ten minutes and activities consisted of tag, playing on the playground, and other similar physical activities. There was a control group who took a passive break where kids sat outside of their classroom and read a book for ten minutes. Researchers collected data on on-task behavior and attention before and after the participants' break.

The major conclusion from Wilson et al.'s (2016) study is that neither the active lesson nor the passive lesson condition greatly affected sustained attention or on-task behavior. Results suggested that after breaks have been completed, students' behavior is not better or worse.

Wilson et al. (2016) found completely different results than Howie et al. (2014). These researchers all conducted a study on physical activity and on-task behavior for students. However, the study that was conducted with only 10- and 11-year-old males was more limited in its participants than that of Howie et al. Howie et al. found a positive connection between physical activity and on-task behavior.

In Mead, Scibora, Gardner, and Dunn's (2016) research, the question of whether different types of exercise during math instruction would improve standardized math test scores was addressed. Researchers added exercise into classes instead of having the class be sedentary. They also gathered a large amount of information on the benefit of using stability balls as seats instead of chairs for students with disabilities. This intervention helped students with disabilities maintain focus, increase attention, and decrease behavioral problems. Because studies have only been conducted with students with disabilities, Mead et al. also sought to determine benefits for students in the general education classroom.

Mead et al. (2016) conducted their research with three sixth grade classes that would be given a MAP test at the beginning and end of the school year in math. Researchers made the first map test their pretest and the end of the school year MAP test their posttest. In the middle of the two tests, the exercise and physical environment was implemented and changed. Among three different classrooms, only one stayed the same. The other two implemented exercise which lasted five to ten minutes with students performing various exercises or with seats changed to stability balls. The stability ball seats were never switched out to regular chairs, and the exercise was completed every day.

Mead et al.'s (2016) main finding was that the MAP scores were significantly higher for the class that sat on stability balls when compared to scores of students in a sedentary classroom. Math scores also increased with the implementation of physical activity into the classroom. When the physical environment of the classroom changes and physical activity is added, Mead et al. suggest that students will increase their focus and attention span as well as improve their academic performance.

All but one of the studies in this section demonstrated that physical activity positively impacts learning associated behaviors in the classroom such as attention span and focus, on-task behavior, and academic performance. Given these findings, how can educators fail to heed the call to this promising best practice?

Brain Breaks Today

Ever since kindergarten students have been asked to sit still. This can be very difficult for a child, or even an adult, to do. The ability to stay focused and on task is one of the strongest predictors of a student's success in school. The problem is that children move. They are active; it is in their genetic makeup! This can cause problems in the classroom. In the checkout aisles of

any department store, there are myriad fidget spinners and other manipulatives to keep kids focused at school. As Ostroff (2014) says, “young children devote most of their waking hours to movement. Children’s bodies, metabolisms, and bone structure are designed to be active all day” (p. 70). These two things competing demands on children require a happy middle where both focus, and movement can be married. Since children are trained at such a young age to sit still and listen in school, one idea would be to embrace their tendency to move and fidget as a prerequisite for developing their focus. Brain breaks off the potential for wide acceptance by students of all ages. Even colleges are looking into implementing brain breaks in classes. Like today’s elementary and secondary students, college students spend the majority of their time sedentary in classes. However, college students, being more mature and independent, have the chance to modify their activity breaks, and create their own to incorporate them into a class (Ferrer & Laughlin, 2017).

Although some teachers may not understand brain breaks or how to use them in a lesson, many may be doing them without even knowing that they are. There are ways to build movement into a lesson by providing natural breaks for children in short stints or during a transition from one activity to another. They can be very informal, and the students may not even realize they are having a movement break at all. Moving into groups where students must rearrange desks, relay races up to the board, or stations where students have to rotate to answer problems are all activities that involve movement without a large cause for commotion (Ostroff, 2014).

No matter what grade level a student is in, the main goal is to be engaged in class, stay focused, and walk away knowing more than you did when you started. As Ostroff (2014) says, “A student’s mind is like an Etch-A-Sketch; it needs to be shaken now and then, to reset the screen and maximize performance” (p. 71). Learning isn’t always about the time spent on a task

but is instead how well one distributes focus in doing said task. Perhaps brain breaks provide an answer to improving focus.

CHAPTER III

METHODS

The purpose of this study was to evaluate the effectiveness of movement/brain breaks. The goal for the intervention is to enable students to maintain focus, deescalate themselves if they are frustrated with a problem, and complete all the tasks at hand. The research question is whether students who receive movement/brain breaks will achieve higher on unit tests in the Learning About Children class than students who do not receive breaks.

Design

This study has a quasi-experimental, variant of a nonequivalent control group design in which students in two pre-existing, non-randomly formed classes of general education students completed a pretest and posttest. It is a variant of the nonequivalent control group design because the classes were not randomly assigned to conditions; instead, the researcher assigned the class with the lower average (although not statistically lower) on the pretest to the experimental condition. The purpose of the pretest was to evaluate whether the groups differed in unit test performance prior to the intervention. Since the pretest and posttest were on different units, they were not identical in content. In addition, they differed somewhat in format. The independent variable was whether students received the brain break intervention. The dependent variable was the score on the unit test completed after the intervention.

Subjects

The subjects in the study were tenth-grade students in a magnet high school located in a suburban county on the East Coast. The school has an enrollment of 1,457 students and 109 classroom teachers. The school population has students represented by the following percentages: 39.53% Caucasian, 37.53% African American, 9.20% Latino, and 8.17% Asian. Of

those 1,457 students, 220 are enrolled in the Science and Math Academy which students are invited to join based on an application process conducted during the winter of each year. This Science and Math Academy helps maintain the school's magnet status. None of the students in the study were in the Science and Math Academy program. Over 40% of the students at this school qualify for free and reduced lunch. The school has a graduation rate of 83%.

The subjects were all tenth-grade students in the general education class, Learning about Children, which is part of the Early Childhood Education Pathway. The Early Childhood Pathway is a group of classes students can sign up for in their sophomore year of school. Most of these students want to work with children after they are finished with school. The classes consist of the first section, Learning about Children, following by Working with Children levels 1 and 2, and finally Independent Family Living. Learning about Children can be taken only by tenth-grade students.

The experimental group class which received the brain break intervention had a total of 27 students. Six are Caucasian, 16 are African American, and five are Hispanic. All these students were female, and three of them were Special Education students. The control group class consisted of 28 students, 15 African American, 12 Caucasian, and one Hispanic. The class had one male student, and the rest were female. There were five special education students in this class.

Instrument

In the beginning of the Working with Children classes, the first units discuss different family structures as well as parenting styles. Later, the classes move into the female and male anatomy as well as conception and prenatal care and into labor and delivery. Following those

units, the classes cover each stage of childhood and the developmental process for each age group.

The pretest contained information from unit one, a combination of family structures and parenting styles. The unit one test covered material over a span of three weeks. The teacher-made test consisted of 25 questions total, eight short answer questions worth one point each, eight multiple choice with four-answer options all worth one point, eight true and false worth one point each, and one essay question worth six points, for a total of 30 points. The researcher estimated the response to the essay question to be around one to two paragraphs. The essay was scored without a formal rubric. The students were given a class period, one hour and 30 minutes, to complete the test if needed. Both classes were given the same test one day apart. There is no reliability or validity data for this test.

The posttest evaluated students' knowledge of the second unit, Anatomy and Fertilization. The four-week unit ended with a teacher-made test consisting of 35 questions, 12 fill-in-the-blank, 13 short answer with an expectation of a two- to three-sentence response, and ten multiple choice with four different answer choices. Each question was a point each for a total of 35 points for a perfect score. Students were given a class period, one hour and 30 minutes, if needed to complete the test. Both classes were given the same test one day apart. There is no reliability or validity data for this test.

Procedure

This researcher was the teacher for the Learning about Children classes. A typical class period includes students coming in and starting the warmup that was listed on the board while the teacher takes attendance. The warmup is discussed, and the teacher presents notes or lectures about what is being covered that day. After the teacher presents information to the class, there

are activities ranging from individual seat work, to group work, to class discussions, as well as small projects that will either be done at the conclusion of class or due the next time the class meets. Depending on what was being covered each day, students did not have much of a chance to get out of their seats unless it was to get into discussion groups or to go and get markers or scissors for a project.

Prior to the intervention, the class took the unit test on family structure and parenting style. The intervention group's mean pretest score (Mean = 22.54, SD = 3.17) did not differ significantly from the control group's mean pretest score (Mean = 23.30, SD = 1.56) [$t(53) = 1.12, p = .27$]. Consequently, it was not necessary to control for pre-intervention differences in ability.

After the family structure and parenting unit test, the experimental group was introduced to brain breaks. They were not made aware they were part of a study. The class was told that they would be doing these breaks, and a schedule was presented to when they would take place. The breaks were to happen halfway through the 90-minute period and would last for no longer than five minutes. A survey was taken to see which type of break would be the most popular in the class. Students were asked to select their top choice between dancing, yoga, walking, moderate activity (jumping jacks, running in place, etc.), coloring, stretching, and other. There was a three-way tie between dancing, moderate activity, and stretching with each option receiving six votes. The final decision was to select randomly each day from one of the three winning activities for the brain breaks.

The breaks were implemented immediately due to the fact the experiment was over a three-week span and that the classes meet on an A/B schedule. There were weeks the class only met twice and others three times. The name of each type of activity was placed on a different

popsicle stick. To choose the type of break each day, a random student in the class pulled a popsicle stick.

When the brain breaks were started, the ones that got the students really going were the dancing and moderate movement activities. The accompanying videos for these activities were from YouTube. They tended to be silly and were geared more towards younger students. The instructors were adults with young children as students. The songs were upbeat and loud. The stretching activity was more like a cool down, spa-like activity because it had an older instructor and a serene background. The music was instrumental and relaxing. After two days in which the activity was stretching, the group decided to eliminate stretching as an activity because the class was in the early morning and the stretching activity made students feel more tired. Subsequently, students participated only in dancing or moderate movement brain breaks. The type of brain break was still randomly chosen each day by a student pulling a popsicle stick.

The class routine remained the same except for the brain breaks. On the board the students were made aware of what time the break would be. They were not allowed to use that time to go to the bathroom or to chat with friends in class. They had to stay close to their seat to participate. In the middle of the period, the students would stop what they were doing and there would be a brain break. The break would only last the five minutes and then the students would have to sit back down and get back to their assignment.

The control group's activities were the same as the experimental group except for the brain break. During the corresponding five-minute time period in which the experimental students were getting a brain break, the control group students were completing their task at hand. They could use the restroom, get a drink of water, or get materials used for that day's

assignment. After the four-week intervention, the students completed the posttest. The results were compared using an independent samples t -test.

CHAPTER IV

RESULTS

The primary purpose of this study was to evaluate the effectiveness of movement/brain breaks. The goal for the intervention was to enable students to maintain focus, deescalate themselves if they are frustrated with a problem, and complete all the tasks at hand. The research question was whether students who receive movement/brain breaks would achieve higher scores on unit tests in the Learning About Children class than students who do not receive breaks.

An independent samples *t*-test was conducted with the independent variable being participation in movement/brain breaks and the dependent variable being the score on the unit test completed at the end of the intervention. The intervention group's mean posttest score (Mean = 28.07, SD = 4.55) did not differ significantly from the control group's mean posttest score (Mean = 29.96, SD = 4.22) [$t(53) = 1.60, p = .12$]. (Please see Table 1.) Consequently, the null hypothesis, that there will be no significant difference in unit test scores of students who receive movement/brain breaks in a 90-minute class period and a control group that does not receive these breaks, was retained.

Table 1

Means, Standard Deviations, and t-statistic for Unit Test Scores

Group	N	Mean	SD	t-statistic
Brain break	28	28.07	4.55	1.60 (NS)
Control	27	29.96	4.22	

NS = non-significant at $p \leq .05$

CHAPTER V

DISCUSSION

The purpose of this study was to determine the effectiveness of brain breaks. The goal for the intervention was to enable students to maintain focus, deescalate themselves if they are frustrated with a problem, and complete all the tasks at hand. The null hypothesis, that there will be no significant difference in unit test scores of students who receive movement/brain breaks in a 90-minute class period and a control group that does not receive these breaks, was retained.

Implications of the Results

Due to the lack of statistically significant findings in this study, this study cannot be used to justify the use of brain breaks as implemented in this study. Having a short ten-minute break in the middle of the class was presented to accomplish the goal to increase the unit scores of the students. The findings in the study would not merit asking teachers taking away instructional time in their class. There would be a great deal of pushback from teachers if they were suddenly asked to participate in these brain breaks. Many would be against the disruption of having to move things around in their rooms, stop the flow of their lessons, and try to teach their students one more thing added to what is already on their plate. Based on the formal findings of the study, it would not hold up well to a faculty when trying to convince them to implement brain breaks in their day.

The breaks did not make a difference with the test scores of the subjects in this study, it did affect their approach and focus in the classroom. After discussing the brain breaks with the students more information was gathered about how effective the breaks were in the students' opinion. Most of them enjoyed the breaks and saw them as something different than just sitting through a long class period without much movement. This researcher speculates that brain

breaks are likely to have a positive impact on attention and focus in the classroom during the 90-minute classes. The more teachers that participate in using brain breaks in their classes the more likelihood the students will be familiar with them and take them seriously. They will be able to realize that they are for their benefit to help with regaining concentration. However, there would need to be more research done to support implementing brain breaks in schools, or even county wide.

Theoretical Consequences

The study conducted did not produce significant results. The data did not show the benefit of brain breaks, and the formal findings based on the outcome didn't support the theories related to movement in the classroom. There was observational data that supported theories connected to the value of physical movement in the classroom environment. Notes that were gathered during the observation period of the study found that the students were enjoying themselves. They seemed to really wake up and become more alert and able to participate in class discussions after the brain break was completed, whereas before they were sluggish and not very responsive.

Realizing that the students were more physically alert in class, in the end may be more beneficial than looking at the numbers of their test scores. Camahalan and Ipolk (2015) found that there seemed to be a shift in classrooms from child centered teaching to testing centered teaching. They believed that the culture of the classroom learning takes negative turns due to the increase of testing pressures. This study wasn't based on the test scores, but to the overall climate in the classroom and how the students focus, and overall attitude changed. Camahalan and Ipolk's study resulted in seeing a classroom teacher use instructional time to build a classroom community where exercise and movement is connected to the educational experience. They

believe that classroom teachers will start to see their students in a different lens using exercises and movement learning experiences. This is exactly what happened after the brain breaks were conducted brain breaks in the researcher's classroom. The class seemed to reach a different level with each other. They saw the researcher being silly trying to do the breaks with them, and maybe saw her as a person and not just a teacher. The class developed better relationships with each other and had fun. The discussions seemed to blossom more around getting to know each other better through these more informal moments in class, and it made the class setting much more natural, which in the end supports the theory that physical activity can foster a classroom community.

Threats to Validity

There were some threats to validity that came up in this study. One internal validity issue was absences with the students in the classes. There are many students who come in late to school, which results in them missing this class due to it being in the morning. Over the period of the study, there were always at least two to three people absent each class. Yes, they can come and get the work they missed, but they miss out on teacher instruction which is the meat of what is covered in these units. This also meant that they missed the days we did the brain breaks. This didn't cause them to fall behind, but if the class covered certain material and they needed instruction on how to execute the breaks, they had missed them, and time was taken out of the next class to explain what was happening.

They may not just be out of class for absences, but students are also pulled out for speech or counseling services which is always done in the morning. The students themselves are diligent about getting notes and work that they miss, but it's not the same as being in class and hearing it

firsthand. This threatened internal validity because students' performance on the test may have been impacted by the absences.

Some of the internal validity issues that were prevalent in this study had to do with the room in general. The room is very small. It has a lot of built-in cabinets and bookshelves which take a great deal of the square footage. The room has tables instead of desk. There are five tables total with six students at each table. This can cause a very congested room when the students as well as their bookbags are settled in. When it was time to do the brain breaks, it not only took extra time to move the tables out of the way, but time to strategize where everyone would stand where they could see how to do each exercise and not be on top of each other. If there were desks in the room, it may have caused the same problem, but the point that the room is already so overfilled caused an annoyance to students who don't like being too close to each other as it is. Eventually the class was able to create a space that was a bit more comfortable to them, and they were able to do what was asked, but it still was not an ideal situation. This likely impacted internal validity because the time spent on moving furniture around and the dislike some students had about being close to each other may have impacted how well the students learned the material and how well they performed on the test.

External threats were based loosely on the students themselves. They are high school aged students ranging from 14-16, the age when it can be difficult to get students up and moving. They were sluggish and not eager to join into a silly exercise with the teacher. Being hesitant made them not be very active, which discredited the point of doing the brain breaks. However, after a few times, things did seem to get easier and they warmed up to the idea. The brain breaks may be more suitable for a younger audience such as middle school or elementary school.

Students also may have been more inclined to do these if they had been doing them for years in earlier grades.

Connections to Previous Studies/Existing Literature

Many of the studies pertaining to brain breaks dealt with students at the elementary level. They differed from my study in the simple fact that the students were about five years older, and in High School. Elementary schools also see the same students all day except for special classes. They also see them every day and not on a rotating schedule as high school does. The students who were tested in the current study were only seen every other day. If it fell a certain way, the class would only meet on Tuesdays and Thursday, where the other class would be Monday, Wednesday, and Friday. This could have an impact on the results since the class didn't meet as frequently as those in other studies.

The study conducted by Janssen et al. (2014) tested the cognitive performance and attention span of a group of 12-year-old students after participating in brain breaks. This study found that both scores and focus improved, but the one thing that stood out in relation to my study was that the students in the Janssen et al. study decided how much effort was put into the brain break that was assigned. No one told them to do it, they participated on their own. This was quite relevant in the current study. At first many of the students seemed hesitant and standoffish. After a day or two of doing the breaks, students took more ownership of it and joined in. This gave them ownership, which eventually led to a higher rate of people participating. Nevertheless, it is possible that the Janssen et al. study found a difference in cognitive performance scores because from the beginning of the Janssen et al. study, students felt that they had more choice in the intervention.

Another study conducted by Howie et al. (2014) primarily looked to see what amount of time allowed for a brain break would be the most beneficial to prove that on-task behaviors impact how students perform academically. Again, this was at the elementary level, but what was similar to the current study was tweaking the timing of the breaks. Which type of brain break was used depended on how long it would last. Some lasted five minutes where others we could have done all class, just because they were so much fun. Recognizing that unlimited breaks are not feasible necessitated finding a middle road, and ten minutes was the sweet spot. If the class gave or took a few minutes from the clock, it was still able to complete the brain break as well as the task at hand for the day. This previous study by Howie et al. also found that out of the three times tested, (five, ten, and 20 minutes) the ten minutes of exercise was the perfect amount to implement into the classroom which overall improved the on-task behavior in children and also improved their academic performance in the classroom. Consequently, the current study provides support to the finding that ten minutes is the optimal time for a brain break.

Implications for Future Research

Future research recommendations would be geared towards teachers who utilize brain breaks in their own classroom. Teachers should explore a range of brain breaks to determine which is best suited to their class, age level of students, as well as what time of day the class fall in. Research should examine the effectiveness of brain breaks if used for an extended period, such as an entire school year. It would also be interesting for a study to find the results of how brain breaks were used in similar and different subjects. Teachers may want to see the benefits of these breaks from not just the test score standpoint, but also the effect on overall classroom climate and relationships that brain breaks forge with the students in the classroom.

Further studies pertaining to this topic could also include Focus Attention Practices, where instead of getting up and moving, the students take a moment to quiet the thousands of thoughts and distractions of that day. This activity focuses more on breathing, which allows a person to pay attention to their thoughts, feelings, and choices. Doing this gives the students an opportunity to change thoughts and feelings that are not serving them well in school. It makes them more aware of their feelings. This may be more helpful in a high school setting rather than the brain breaks which seem to be more suitable for the elementary levels.

Summary

The study looked at brain breaks in the classroom to determine whether implementing them would improve students' test scores. One class partook in the brain breaks, and the other class did not. The study found that brain breaks did not improve student performance on unit tests. Clearly, the results in the current study in isolation would not be the basis for instituting brain breaks in all classrooms. Nevertheless, observational data suggests that there may be value as an intervention, at least with some groups of students. Observational data suggests that the breaks did not change test scores but do have a positive impact on classroom culture and the teacher-student relationship. In a 90-minute class period many students may lose focus or not maintain behaviors appropriate to learning. Movement and brain breaks provide a way to chunk this long class period and refresh and rejuvenate the student. Getting out of their seat, taking a break, and becoming less frustrated in their assignment may allow students to refocus to complete their work in the class and decrease the unwanted behaviors.

Classrooms today are not like they are shown in olden day pictures and movies, with children sitting in their desks in a straight line with their hands folded on top of the desk, waiting

for instruction. Today's students have many distractions that hamper their learning. Perhaps brain breaks can provide the answers to some of these problems.

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