THE EFFECTS OF CURRENT BRAIN RESEARCH

IN THE SCIENCE CLASSROOM

by

Rebecca Beacham Fulk

A professional paper submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

In

Science Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

July 2012

STATEMENT OF PERMISSION TO USE

In presenting this professional paper in partial fulfillment of the requirements for a master's degree at Montana State University, I agree that the MSSE Program shall make it available to borrowers under rules of the program.

Rebecca Beacham Fulk

July 2012

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

In this investigation brain breaks were implemented with the goal of improving student focus and learning in an afternoon science class. Different styles of breaks were offered each afternoon and quality of learning was monitored. Though students felt certain breaks were ineffective, on task behavior and grades improved after treatment.

INTRODUCTION AND BACKGROUND

Project Background

Teaching Experience & Classroom Environment

For the past three years, I have been teaching at Steamboat Springs Middle School in Steamboat Springs, Colorado. Steamboat Springs is a ski town of about 10,000 residents. The middle school has a total of 462 students, with 92% being of Caucasian descent. Retrieved from http://www.city-date.com/school/steamboat-springs-middle-school-co.html. We had 154 seventh graders enrolled during the 2011-2012 school year. I teach seventh grade math and science on a team of two, my partner teaching language arts and geography. Between the two of us, we share a total of 53 students. The majority of the students were Caucasians, and five students were of Hispanic descent. During treatment the students were studying cellular energy, the skeletal system, and the muscular system. Most of my students live a privileged outdoor lifestyle. I see my students on the ski mountain, in yoga class, and at the skate park.

In January 2009, I attended a staff development workshop that was focused on brain breaks in the middle school classroom. A classroom brain break is an organized break that reenergizes your brain to continue learning. I spent that morning with my colleagues learning about current brain research and how teachers can incorporate brain breaks into their classes. From that day forth, I was motivated to embed these activities within my science courses. Once I began incorporating exercise breaks in my classroom, I found myself wondering how these breaks impact student learning? The staff development workshop essentially led me to focus my capstone project on incorporating

different types of breaks in my science classroom and monitoring the effects the breaks have on my students. I am most interested in improving the quality of learning directly after lunch when I see a decreased level of focus in my science classroom.

Focus Question

I investigated the effects of current brain research in the science classroom. My primary focus question was, Do whole brain learning activities improve achievement within the science classroom? Specifically, I want to know if brain breaks affect working memory, on-task behavior, and level of focus in my afternoon science classes. In addition, I asked two sub-questions: What are the most beneficial brain breaks for middle school students? and Can I impact student learning by implementing breaks in my afternoon life science classroom?

CONCEPTUAL FRAMEWORK

Physical movement in the middle school science classroom can help adolescents learn better. One does not need to be a physical education teacher to adhere to this concept. In fact, with today's budget cuts, physical education is often considered a luxury. Ratay (2008) found that only 4 % of elementary schools provide daily gym classes, while eight percent of middle schools do.

While the Greeks believed that physical activity was linked to intellectual abilities, it hasn't been until recently that the relationship between exercise and

adolescent cerebral function has been systematically evaluated. Sibley and Etnier (2003) determined a positive relationship between exercise and cognitive performance in school-age children. Their results found that the effects of exercise were greatest for middle school and young elementary age children. Exercise has been found to improve learning, enhance mental performance, stimulate neurogenesis, and increase levels of brain-derived neurotrophic factor (Cotman, 2002). Brain-derived neurotrophic factor is a protein found in the brain that encourages the growth of new neurons. Research states that the brain has the ability to grow new brain cells through physical activity. Ratey (2008) found that exercise creates the optimal environment for the brain to create new brain cells and protect and build the existing ones. Children who are physically fit display greater cortical activation and corresponding cognitive performance than less fit children (Hillman, Castelli, & Buck, 2005).

When studying the processes of the mind, one can focus on perception, attention, memory, and information processing (Tomporowski, Davis, Miller, & Naglieri, 2008). Memory storage is a cognitive function that results in higher academics. Acute exercise was found to have beneficial effects on memory storage processes in preadolescents (Pesce, Crova, Cereatti, Casella, & Bellucci, 2009). While exercise can aid in memory, it may also benefit the process of problem solving. Adolescents who are poor problem solvers have a general working memory deficiency. Passolunghi and Siegel (2001) explained that a poor problem solver's working memory deficit is related to a failure of an inhibitory mechanism when processing information.

Higher fit adolescents show greater hippocampal volume. The hippocampus is a major component in the limbic system and is located in the temporal lobe of the brain. An

increase in hippocampal volume corresponds with better memory task performance. A way to increase hippocampal volume is through exercise. Exercise increases the size of the anterior hippocampus, leading to improvements in memory (Chaddock et al., 2010).

A wide range of exercise techniques could be used in an academic classroom. Sibley and Etnier (2003) found positive effects after applying resistance training, motor skills training, physical education interventions, and aerobic training programs. In addition to the above aerobic activities, teachers can integrate cross lateral movements and balance activities. Communication between the brain's two hemispheres occurs through a large bundle of nerve fibers (neurons) called the corpus callosum (Ratay, 2008). This left and right side brain crossover in the brain can make classroom breaks beneficial to the learning process. The crossing over occurs through midline movements that involve moving left to right and crossing over the midline of your body. When one uses the coordination of body movements and stretching in combination with deep breathing the body's overall circulation is improved. Yoga breaks are found to increase blood and oxygen levels throughout the body, and in turn affect the central and autonomic nervous systems (Lalvani, 1999).

By allowing adolescents a chance to stand up and move, one is increasing the amount of oxygen distributed to the brain. According to Lupton (2007), children's concentration times are based on their age. For example, an eight year old can concentrate for approximately eight minutes, while a nine year old can concentrate for about nine minutes. One can give or take a few minutes, depending on the child's ability. Madigan (2004) explained that short breaks from focused concentration allow the brain to consolidate information for better retention and memory retrieval. Madigan also states

that when a human sits for longer than 20 minutes, blood is pooled in the hamstrings and the brain is robbed of oxygen and glucose.

The length of time required for acute exercise to benefit information processing was found to be at least 15-20 min. (Audiffren, Tomporowski, & Zagrodnik, 2008). However, Madigan (2004) states that breaks can be beneficial even if they are one to five minutes in length and include some physical exercise. Teachers cannot take 20 minutes each class for exercise and breaks but can begin to incorporate time for quick activities.

There are many aerobic activities that teachers can incorporate into their science classroom. Instructors can allow for running in place, jumping jacks, push-ups, or even kickboxing. These activities can be performed directly beside the student desks, or if space is an issue, one may take the students into the hallway. Aerobic activity not only increases blood flow to the brain but also speeds recall and reasoning skills (Sibley & Etnier, 2003).

Creativity is important when designing an exercise break. After teaching for 15 minutes, Madigan (2004) suggests that one should have the class stand, take a deep breath, and jump up and down three times. Next, turn around three times and walk seven steps in any direction. After the seven steps, shake hands with the closest person and tell that person two to three ideas you learned from the lesson. When finished, the students should tell that person goodbye, walk back to their desk, and record two to three ideas from the lesson. This could take up to five minutes out of class time, but one has allowed the brain to redistribute blood, organize processes, and refresh itself. By engaging with other students, and using their information, the brain has strengthened the information taught.

Although aerobic exercise is beneficial to classroom learning, so are cross lateral movements within the brain. When students perform cross lateral activities, blood flow is increased in all parts of the brain making it more alert and energized for learning. One classroom activity is called Cross Crawl. Crawling stimulates both sides of the brain and eases the learning process. The students stimulate both sides of their brain by touching their right elbow to their left knee and then their left elbow to their right knee. These movements reinforce and develop neural pathways from the back of the brain to the front of the brain. When you do the Cross Crawl on a regular basis, you stimulate more nerve networks, potentially improving communication between the two hemispheres. This can easily take place in the classroom, next to the student's desks (Hannaford, 1995).

Another cross lateral movement is named Cook's Hookup. This exercise can be performed standing, sitting, or lying down. First, cross one ankle over the other. Then stretch your arms out in front of you, with the backs of your hands together and your thumbs pointing down. Lift one hand over the other (with your palms facing each other) and interlock your fingers. Roll your locked hands straight down and in toward your body, so they eventually rest on your chest with elbows pointed down. Hold the position for two minutes to maximize the benefits (Hannaford, 1995).

Cross lateral movements, a type of whole brain learning, influence how we learn. When one accesses parts of the brain previously not accessed, adolescent learning is heightened. If higher-level thinking were a result of integrating the two hemispheres of the brain through movement actions, then it would be beneficial to include this style during physical activity breaks in the science classroom (Ratay, 2008).

Balance activities are also considerable aspects of physical movement that should be considered when taking classroom breaks. According to Madigan (2004), balance improves reading capacity. This is due to the vestibular (inner ear) and cerebellum (motor activity) systems. When these two systems work closely with the reticular activation system (RAS), attention is affected. The RAS is located at the top of the brain stem and is crucial to our attention system. When all of the systems interact, balance is kept, thinking is turned to action, and moves are coordinated. Balance activities include yoga poses, as well as sitting on stability balls.

If stability balls are impractical to obtain, one can easily incorporate yoga into their classroom. Yoga incorporates physical postures, breath control, mental concentration, and deep relaxation to promote the body's mental state. Yoga can be used to clarify student's minds prior to an assessment. In addition, there are certain yoga poses that ultimately calm students' minds. One example of a yoga pose is Savasana (Corpse Pose). This particular pose calms the brain, lowers blood pressure and helps relieve stress and mild depression (Stewart, Forneris, & Theuerkauf, 2010). One can incorporate a variety of yoga poses within short classroom breaks. This can include deep breathing, physical postures, or relaxation exercises. Peck, Kehle, Bray and Theodore (2005) found that students who participated in yoga sessions three times a week responded with an increased attention span during class.

METHODOLOGY

My capstone research occurred between February and late April of 2012. During the eight-week treatment period, brain breaks occurred everyday during an afternoon life science class (*N*=24). The breaks took place halfway through the class. The research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained. During the first week, I collected pre-intervention data through a Prior Knowledge Likert Survey (Appendix A). This enabled me to introduce the study and measure the students' prior knowledge on exercise. This survey asked the students to rank the importance of exercise breaks, as well as determine what breaks the students think work best for them. The same survey was administered at the end of my treatment period. The data was organized according to themes.

On-task behavior data was also collected as pre-intervention data. The data was collected through the use of a tally sheet and check marks were used to verify if each student exerted on-task behavior. On-task behavior is defined as being attentive, not disruptive, and completing assignments. I had a student roster and columns labeled on-task and off-task. This took place halfway through the class. During the next eight weeks the data was collected on a weekly basis. Each week, the tallies were analyzed and improvement or non-improvement was recorded.

The students also answered a reflection prompt each Friday in their journals using various prompts as found in Journal Prompts (Appendix B). To begin the study, I

recorded the most current science test grade for each of the students and looked at any changes after twelve weeks. In addition, the average class grade was recorded.

During weeks two and three, the students received a three-minute afternoon break focused on yoga poses. Garudasana (Eagle Pose) was introduced on Monday of week two and was repeated each day that week. At the beginning of week three, Vrksasana (Tree Pose) was introduced and used throughout the week. After the exercise breaks I continued to make direct behavior observations using the tally sheet on the students on-task behaviors. At the end of the day, the daily totals were calculated for on-and off-task behavior. During week three, I had students take an online survey reflecting on their behaviors and the effects of the yoga breaks. This survey was administered through survey monkey (Appendix B). It included questions such as: how do you feel after yoga breaks and what yoga poses allowed for you to concentrate more? Survey monkey organized the results in graphs and tables and I looked at themes.

For weeks four and five, the three-minute breaks focused on cross lateral brain movements. The Cross Crawl exercise was introduced on Monday of week four and was repeated each day that week (Figure 1). During week five, Cook's Hookup was performed each day. I had the students participate in a Short Memory Recall Assessment on Fridays of both weeks (Appendix C). For these assessments, I said words, numbers, and letters out loud. After recording as many as the students could recall in their journals, the class took a cross lateral brain break. The same verbal assessment was administered after the break. I want to know specifically how students' working memory was affected. The students recorded the difference in their scores and turned them in. The results were recorded in an Excel spreadsheet and graphed. After the participants reflected in their

journals, I looked for themes in their responses. On-task behaviors continued to be recorded each week using the tally sheet. I continued to average the daily totals for on-and-off task behavior.

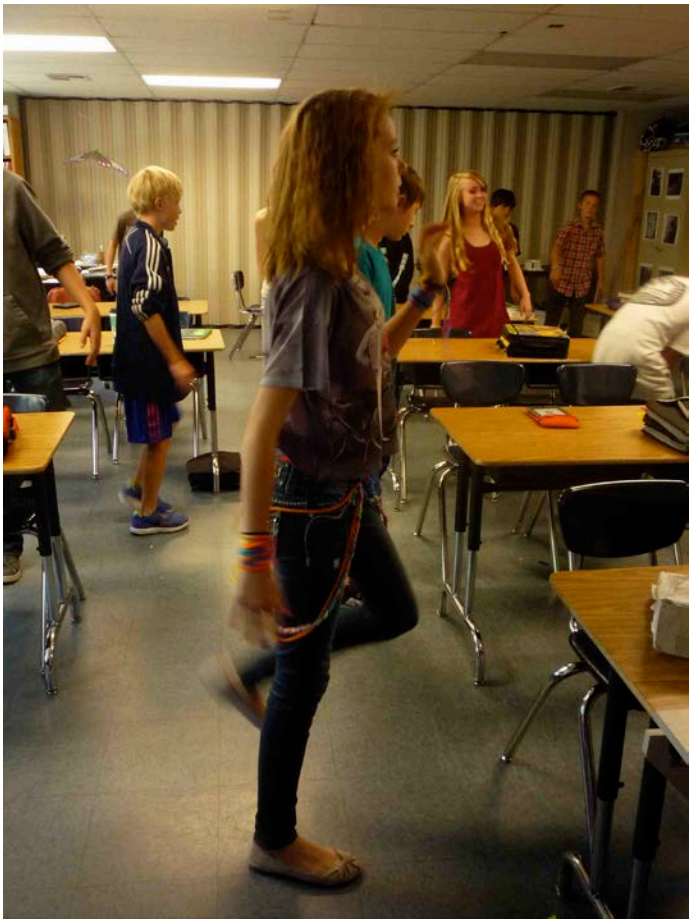


Figure 1. Student demonstrating a version of Cross Crawl.

During weeks six and seven, aerobic activity was the focus of the breaks. During week six, the students ran around the school's arcade each afternoon. It was during week seven that I asked the students to perform mountain climbers. I either timed them for a minute or asked that they complete 20 mountain climbers during the allotted break. All students were interviewed. Questions were asked about their ability to focus after the

aerobic brain breaks using the Interview Questions (Appendix D). Field notes were taken that centralize on the class' level of focus during class time. After on-task behavior was recorded, I looked at the number of students whose on task behavior improved. The students continued to record a reflection in their science journal as they have every Friday.

The data collected during week eight focused on the most beneficial brain break. During this last week, I had the students reflect on the three styles of exercise breaks. We had small group discussions in the class. The students were asked to provide an overall journal reflection on all of the exercise breaks. I collected journals and began to sort the responses by themes. Average grades were compared over the course of the eight weeks. A summary of treatments is located in the data triangulation matrix (Table 1).

Table 1
Data Triangulation Matrix

Research Questions	Data Source #1	Data Source #2	Data Source #3
Do cross lateral breaks affect working memory?	Memory assessment	X	X
Do yoga breaks affect on task behavior?	Direct observations	Online survey	Likert survey
Do aerobic breaks affect level of focus?	On/off task behavior tallies	Interviews	X
Do brain breaks improve achievement?	Test grades	Class averages	X
What are the overall most beneficial types of breaks?	Field notes	Interviews	Journals

DATA AND ANALYSIS

When my students (*N*=24) were initially surveyed through the Prior Knowledge Likert Survey (Appendix A) on their perceptions of a brain break, 50% of the class responded that a brain break is when you give your brain a rest from thinking. One stated, “I think breaks should not be thinking required, because that is what we have been doing all of the time.” Another 25% of the students related brain breaks to exercise. When asked to give examples of breaks that past teachers have given, half of my class has had teachers take them on walks outside. Of the twenty-four students surveyed, 25%

had previously participated in some type of stretching break. Every student in my classroom claims to spend at least an hour doing some form of exercise each day.

Overall, my students claimed that it is harder for them to focus in the afternoon. There were 38% of my students who said it is harder to focus in the morning, versus 58% who found it harder to focus in the afternoon. One student stated, “I am just tired in the AM and really talkative in the PM.”

Three types of brain breaks utilized in my middle school classroom provided benefit for centralizing attention (Figure 2). The greatest behavior improvement was shown after Cook’s Hookup. Over the course of weeks four and five, there were 66% of my students who were more focused after completing Cook’s Hookup, while 42% of participants were more focused after completing the Cross Crawl. There were 50% of my students who showed on task behavior improvement after having completed a break that involved mountain climbers, an aerobic exercise, during class. Running around the arcade enabled an equivalent of 35 % of my class to refocus. Lastly, Eagle Pose aided in refocusing the equivalent of 17% of my class, while Tree Pose helped refocus an equivalent of 38% of participants.

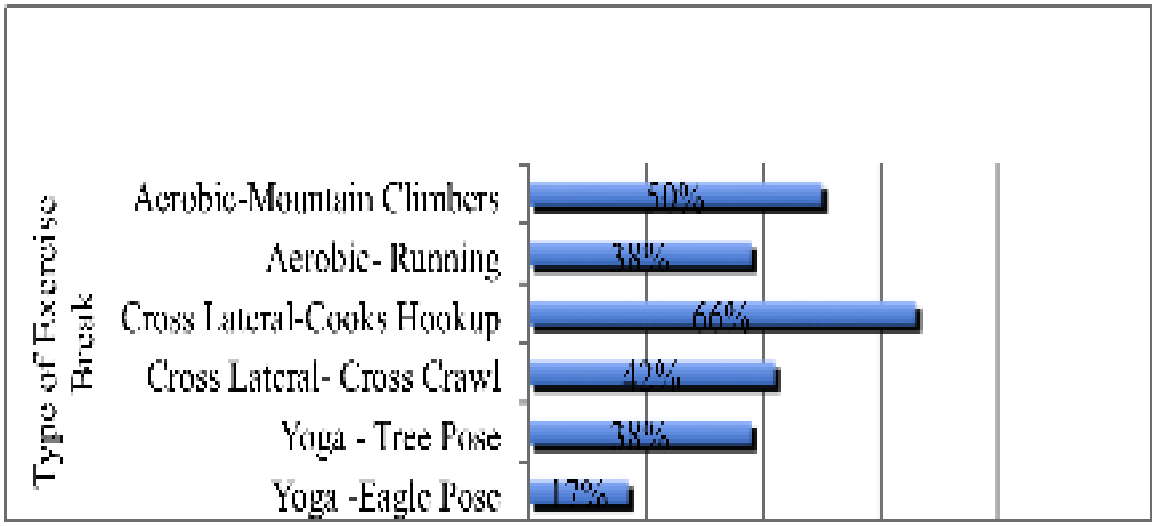


Figure 2. Weekly on task behavior improvement after exercise break, (*N*=24).

The participants themselves had a different perspective. I discovered that 50% of my students felt that cross lateral brain breaks were not beneficial to them. One student stated, “I felt that cross lateral brain breaks were pointless for me and I don’t understand why we do them.” Another student said, “ These breaks are nice to have, but because I’m usually on task and focused, they are nothing but a luxury.” However, 25% of my class claimed that cross lateral breaks helped them focus and another 25% claimed the breaks calmed their mind. Regarding cross lateral breaks, one student stated, “After I complete a cross lateral brain break, I am more focused.” Another participated said, “Sometimes cross lateral breaks help me to focus and other times the breaks don’t help my focus.”

Cross lateral brain breaks provided the greatest on task behavior improvement. I administered two Memory Recall Assessments (Appendix D). The first memory recall

occurred after Cook's Hookup during week four. Sixty-seven percent of the class improved their working memory after the cross lateral brain break. While 13% of the participants had a score that did not change, there were 21% who demonstrated lower working memory. The results of the second memory recall showed that 42% of the class saw improvement with their working memory and 58% of the class showed no improvement (Figure 3).

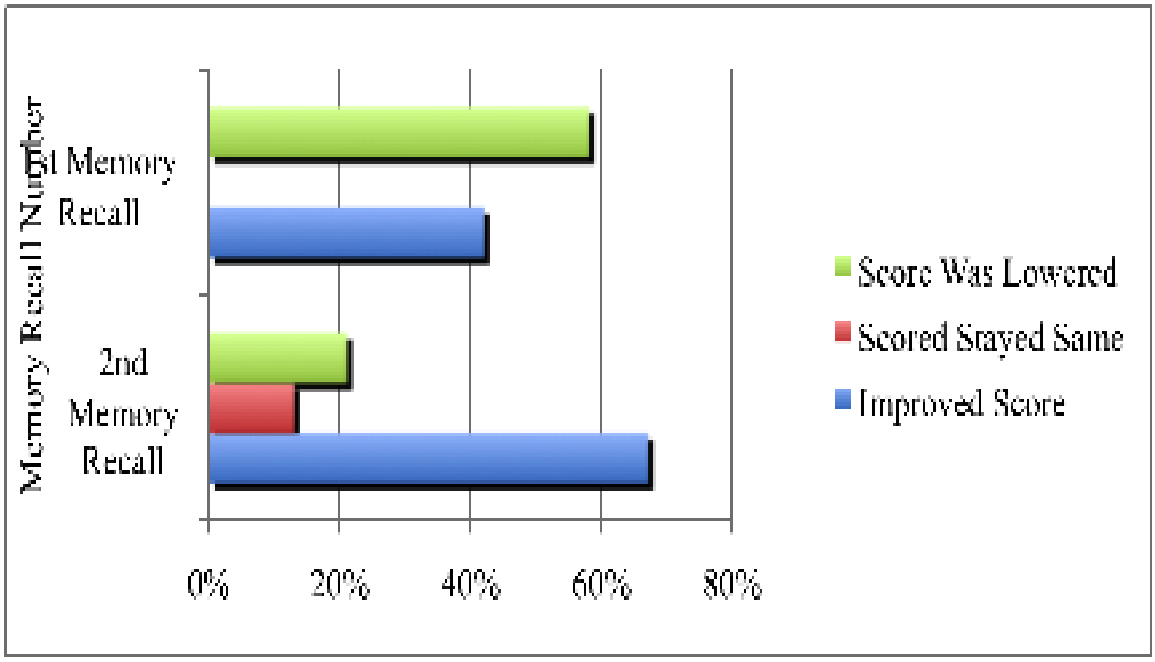


Figure 3. Results from memory recall, (*N*=24).

In regards to cross lateral brain breaks, one participant stated, "I have found that the breaks exercise my brain by connecting the points and this helps me concentrate." Another student added, "Cross lateral brain breaks help me focus and make me less distracted."

The majority of my students prefer aerobic breaks (Figure 5). In fact, 54% of the participants determined aerobic breaks to be most beneficial (Figure 4). One participant stated, “I feel that aerobic breaks are good for me because they get my blood flowing.”

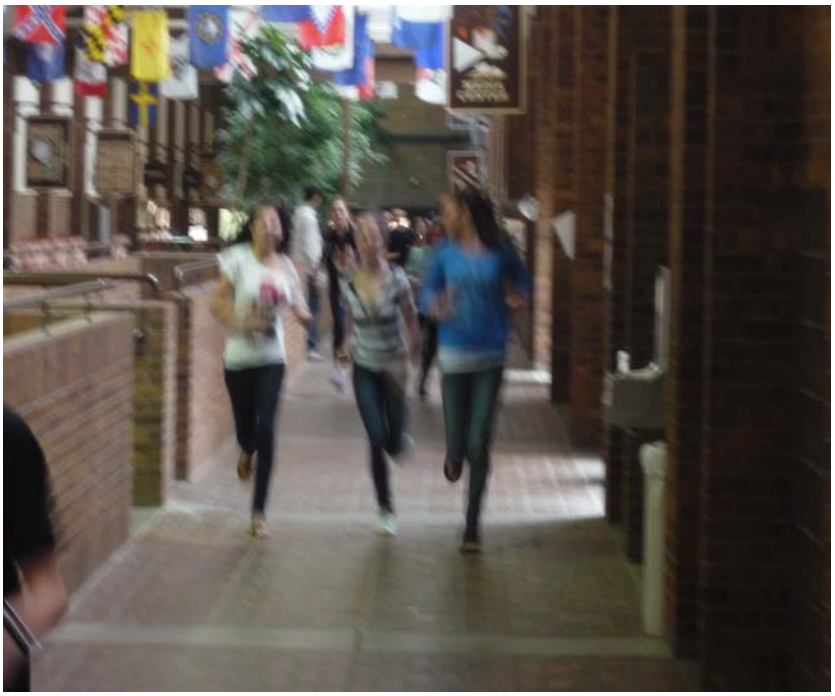


Figure 4. Participants running around arcade.

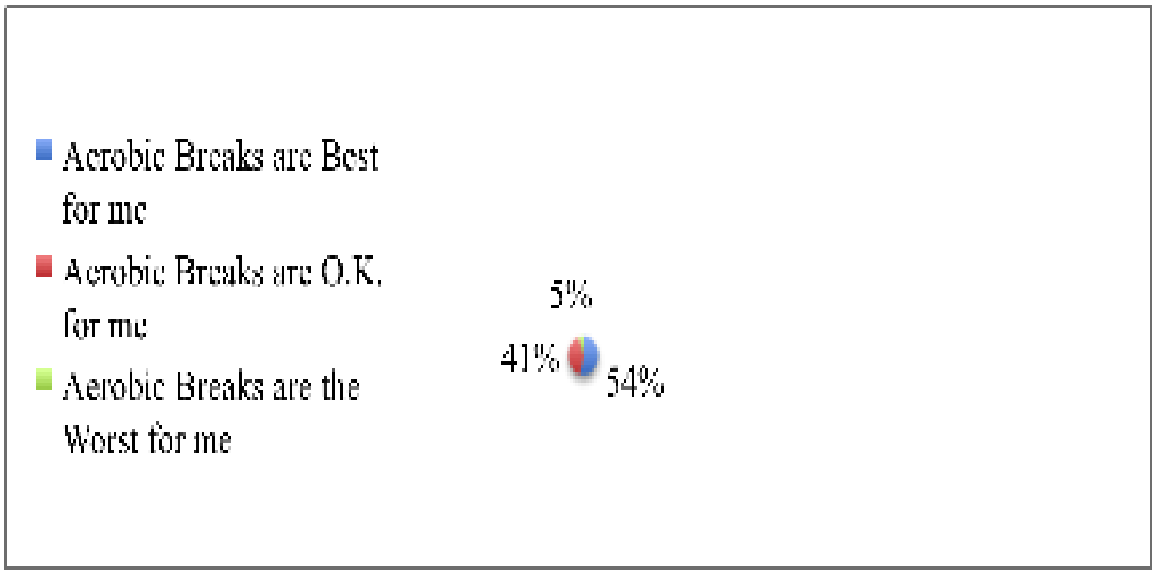


Figure 5. Results from aerobic break journal entry, (*N*=24).

When the class was asked to reflect on the most beneficial brain break, 28% of my seventh graders claimed that yoga breaks were the most beneficial break for them. One student replied, “I like yoga breaks because they clear and calm my mind.” There were forty-five percent of the participants felt that yoga breaks have a calming effect. Another 39% claimed that yoga breaks enabled them to have a greater level of focus. Regarding focus, one student stated, “I like yoga breaks because they soothe me to where I can focus and work harder.” There were eight percent of my students who found that yoga breaks relieve stress, however, 13% of participants did not find any benefits from yoga (Figure 6).

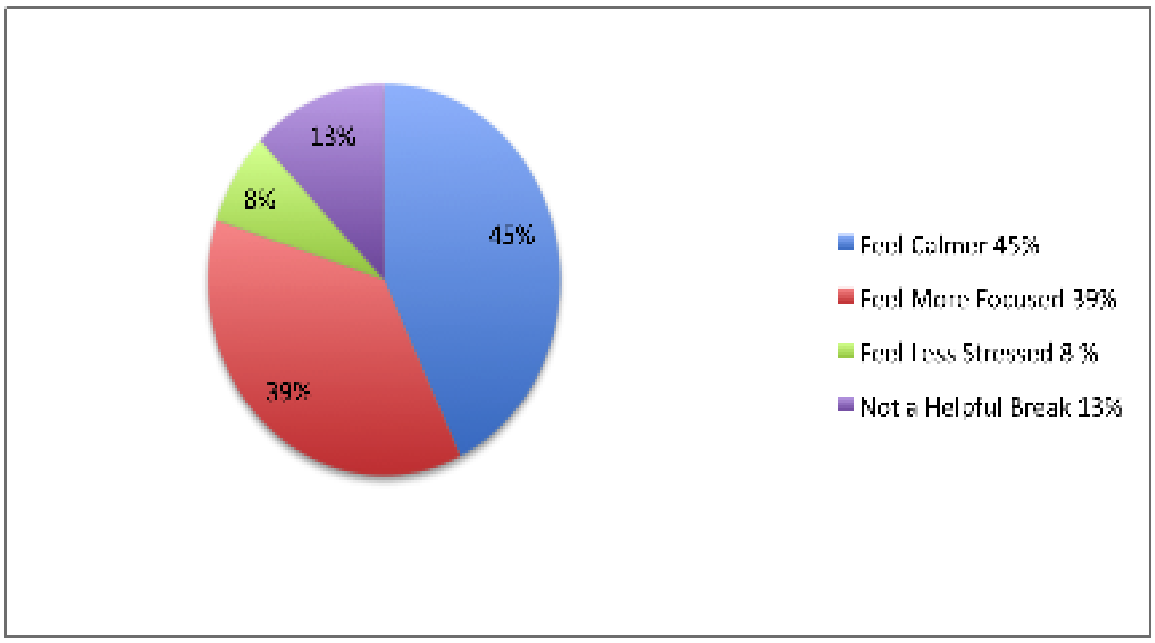


Figure 6. Effects of Yoga Breaks, (*N*=24).

Overall, science grades improved when breaks were incorporated. While 38% of my students improved their midterm average by a letter grade, another 8% increased their average grade by two letter grades. While 29% of participants did not show a change in grades, there were 25% of my students whose science grade dropped over the course of treatment. The average classroom grade was 85% when treatment started and 87% when treatment ended.

INTERPRETATION AND CONCLUSION

This study provided evidence that brain breaks in an afternoon science classroom can contribute to improved level of student focus. When I interpreted the results from my

treatment, on-task behavior improvement within my classroom stood out the most. With an increase in on task behavior, improved grades were bound to follow.

I found numerous pieces of data that support exercise breaks in a science classroom. One of the most obvious pieces of data is the students' grades. I saw a two point increase in my class average over the course of treatment. I realize that while the breaks may have contributed to an increase in grades, the relevance of material being taught could have impacted grades.

On-task behavior improvement after short classroom breaks is a key piece of evidence themed throughout my data. As I reflect on the study, I realize that there may be mistakes within the data collection. I was the sole person who tallied on-task behavior and taught the class. It is possible that I over-looked students who were off-task. However, as the study progressed, I found myself more aware of when students were not focused and refocus them through use of a break.

Over time, my students have grown accustomed to transiting from academics to exercise breaks and being as efficient as possible. I feel that my students have become more familiar with themselves as a student. My hope is that the students will recognize when they lose focus in class and perform a breathing exercise to refocus.

According to Pesce, Crova, Cereatti, Casella, & Bellucci (2009), acute exercise should improve working memory. However, the results of the study were inconclusive as to whether or not cross lateral breaks affect working memory. While the working memory assessment I administered provided adequate results, I feel that some students were more or less familiar with certain vocabulary and that affected their responses.

VALUE

The experience of designing and conducting my capstone project has changed my perception of how students learn best. I have learned how to collect and use data within each of my science classes. Once I receive feedback from my class, I address the feedback. As a result, I am more aware of what teaching strategies work best for each individual class and in fact, each student. Overall, I have become a better teacher.

I realize that a well-planned lesson includes movement and tactile components, but there are many times students must sit still to take notes or assessments. I have found that incorporating a short break makes all the difference. While some students can sit through a 45-minute class without movement, the majority of middle school students benefit from movement. Madigan (2004) states that if you are going to move students, then why not move them with intention.

The success of incorporating breaks in my classroom has inspired me to continue weaving breaks into my classroom. While this research project has given me the confidence to recognize when my students need a break, I also want my students to be comfortable in recognizing when they need a break. I want my students to become more familiar with their ability to focus and learn to be an advocate for themselves. This being said, my final goal is to encourage my students to take control of their learning and use exercise breaks to expand their capacity to focus during class.

REFERENCES CITED

Audette, T., (2004). Exercise, quick snack tame literacy test jitters. *The Standard. 5.*

Audiffren, M., Tomporowski, P.D., & Zagrodnik, J. (2008). Acute aerobic exercise and information processing: energizing motor processes during a choice reaction time task. *Acta Phychologica, 129,* 410-419.

Chaddock, L., Erickson, K.I., Prakash, R.S., Kim, J.S., Voss, M.W., Vanpatter, M., Pontifex, M.B., Raine, L.B., Konkel, A., Hillman, C.H., Cohen, N.J., Kramer, A.F. (2010). A neuroimaging investigation of the association between aerobic fitness, hippocampal volume, and memory performance in preadolescent children. *Brain Resolution, 1358,* 172-183.

Cotman, C.W. (2002). Exercise: a behavioral intervention to enhance brain health and plasticity. *Trends in Neuroscience, 25,* 295-301.

Hannaford, Carla. 1995. *Smart Moves: Why Learning Is Not All in Your Head*. Arlington, Va.: Great Ocean Publishers.

Hillman, C. H., Castelli, D., & Buck, S. M. (2005). Physical fitness and neurocognitive function in healthy preadolescent children. *Medicine & Science in Sports & Exercise, 37,* 1967–1974.

Kilbourne, J. (2009). Sharpening the mind through movement: using exercise balls as chairs in a university class. *Chronicle of Kinesiology and Physical Education in Higher Education*, *20*(1), 10-15.

Lalvani, V. (1999). Classic yoga for stress relief New York: Sterling Publishing Co., Inc.

Lupton, M. (2007). Education: Raising their game: Can lots of yoga, badminton, netball and aerobics lead to better SAT results? *Guardian Education. 6.*

Madigan, J.B. (2004). The new recess model. *Texas Elementary Principal and Supervisors Association Journal Instructional Leader, 9,* 2-3.

Passolunghi, M.C, & Siegel L.S., (2001). Short term memory, working memory, and inhibitory control in children with difficulties in arithmetic problem solving. *Journal of Experimental Child Psychology, 80,* 44-57.

Peck, H. L., Kehle, T. J., Bray, M. A., Theodore, L. A. (2005). Yoga as an intervention for children with attention problems. *School Psychology Review, 34,* 415-424.

Pesce, C., Crova, C., Cereatti, L., Casella, & Bellucci, M. (2009). Physical activity and mental performance in preadolescents: effects of acute exercise on free -recall memory. *Mental Health and Physical Activity, 2,* 16-22.

Ratay, J.J. (2008). *Spark.* New York: Hachette Book.

Sibley, B. A., & Etnier, J. L. (2003). The relationship between physical activity and cognition in children: a misanalysis. *Pediatric Exercise Science. 15,* 243-256.

Steamboat Springs Middle School Data. (2012). Retrieved from http://www.city-data.com/school/steamboat-springs-middle-school-co.html

Stewart, A.D., Forneris, T., & Theuerkauf, B. (2010). Yoga in school communities. *Strategies: A Journal for Physical and Sport Educators, 23,* 17-20.

Tomporowski, P.D., Davis, C.L., Miller, P.H., Naglieri, J.A., (2008). Exercise and children's intelligence, cognition, and academic achievement. *Educational Psychology Review, 20,* 111-131.

Zervas, Y., Danis, A., & Klissouras, V. (1991). Influence of physical exertion on mental performance with reference to training. *Perceptual and Motor Skills, 72,* 1215-1221.

APPENDICES

APPENDIX A

PRIOR KNOWLEDGE LIKERT SURVEY

Participation is voluntary & participation or non-participation will not affect your grade. This questionnaire is to help me understand what you know about exercise in the classroom and how it affects you as a student. Circle the number you choose.

	Agree	Tend to Agree	Tend to Disagree	Disagree
1. It is easier for me to focus in class in the morning.	1	2	3	4
2. It is easier for me to focus in class after lunch.	1	2	3	4
3. I spend more than an hour exercising each day.	1	2	3	4
4. I feel more energized and ready for core classes after PE class.	1	2	3	4
5. Prior to taking a test, I have nervous energy.	1	2	3	4
6. I believe that exercise breaks would help me stay on task in science class.	1	2	3	4
7. I feel that I could pay attention better if I were given an exercise break each afternoon.	1	2	3	4
8. I can tell a difference in myself as a student after a classroom break.	1	2	3	4

9. What do you think a brain break is?

_____

_____

10. What types of exercise breaks have other teachers used in their classrooms at Steamboat Springs Middle School? List below

_____

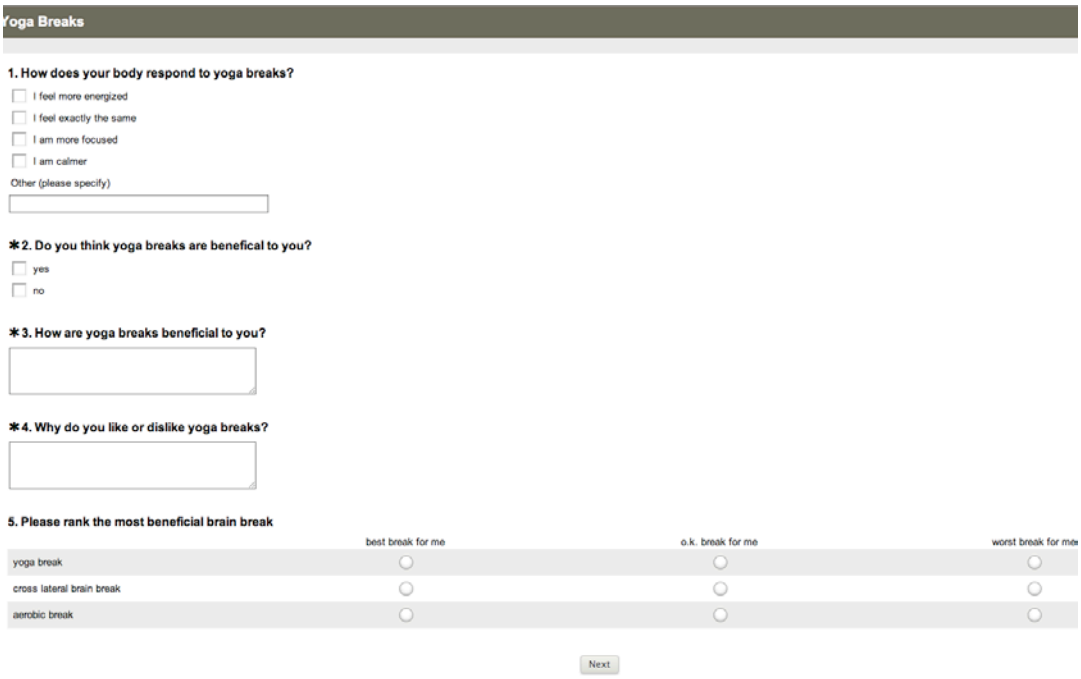
_____

_____

11. If I could choose any type of exercise break, I would choose_____
Explain:

APPENDIX B

YOGA SURVEY



Yoga Breaks

1. How does your body respond to yoga breaks?

- [ ] I feel more energized
- [ ] I feel exactly the same
- [ ] I am more focused
- [ ] I am calmer

Other (please specify)

*2. Do you think yoga breaks are benefical to you?

- [ ] yes
- [ ] no

*3. How are yoga breaks beneficial to you?

*4. Why do you like or dislike yoga breaks?

5. Please rank the most beneficial brain break

	best break for me	o.k. break for me	worst break for me
yoga break	○	○	○
cross lateral brain break	○	○	○
aerobic break	○	○	○

Next

APPENDIX C

JOURNAL PROMPTS

JOURNAL PROMPTS

Week 1:
Why do you think students have better behavior some days versus bad behavior on other days?

Week 2:
What are your thoughts on incorporating yoga in our afternoon breaks?

Week 3: None

Week 4:
How did the brain break affect your score? Explain how it made you feel.

Week 5:
How did the brain break affect your score? How did it compare to last Friday's recall activity?

Week 6:
Reflect upon the breaks we have taken. Do you find some work better than others? Which ones and why?

Week 7:
How does the aerobic activity breaks affect you?

Week 8: Have students write about their favorite type of break. Why and how does it make them a better student?

APPENDIX D

MEMORY RECALL ASSESSMENT

MEMORY RECALL ASSESSMENT

I will say the following words, numbers, and letters out loud. The students will record as many as they can remember in their journal.

SCIENCE

SEVEN

ORGAN

A

LIFE

Z

FOUR

EXPERIMENT

CENTIMETER

TWENTY

TUESDAY

LARRY

LIZARD

DECEMBER

SEVENTH

APPENDIX E

INTERVIEW QUESTIONS

INTERVIEW QUESTIONS

1. What is the most difficult aspect of my afternoon science class?

2. How have you found the breaks to help you as a student?

3. How does moving around affect your learning?

Anything else you want me to know?