Running Head: PHYSICAL STIMULATION AND COGNITIVE PERFORMANCE

Research Proposal:

Physical Stimulation and Cognitive Performance

Amber Moore, Sarah Kraus, Savanah Hopper

Western Carolina University

Abstract

The proposed research is designed to address physically stimulating academic games in the classroom. The focus of the study is on academic performance in relation to physically stimulating academic games. Participants will include 100 third grade students from Cullowhee Valley Elementary School in Jackson County. Parents of the participating students will be met by appointments in order to receive informed consent, however, they will not be told the true purpose of the study. Following the experiment, the students will partake in a comprehensive test, then after the scores are gathered, there will be a short debriefing telling the students the main purpose of the study. The more excess energy exported is expected to be associated with higher comprehension test scores. We can determine if that is true through the use of a T-test comparing no physical stimulation to physical stimulation. The proposed research will provide an alternate way in undertaking students’ attention by allowing them to export excess energy through physically stimulating academic games.

Research Proposal:

Physical Stimulation and Cognitive Performance

The proposed study is designed to see if physically stimulating academic games effect comprehension test scores. Sitting still and paying attention for long periods of time can be very challenging. It is not uncommon for people to start doodling, tapping their pens or fingers, moving around in their seats, messing with their phones, writing to-do lists, or even talking out of turn after a short amount of time to entertain themselves. Children are expected to sit, listen, and comprehend verbally presented educational material for extended periods of time, and those who are required to sit for extended periods of time develop a loss of circulation, hyperactivity, and attention deficits, Zentall, (1975) . According to Kercood and Banda (2012), physical exertion in school aged children is conducive for prolonged attention. It is nearly impossible to make the entire school day physically stimulating, so it is important to incorporate some activities into the classroom. If the students were a little less energetic and less stimulated by distractions, it should make it easier for them to pay attention in class.

Paying attention in class is getting harder and harder for most, not only because younger students lack the attention span, but because there are so many new distractions compared to the past. Here I define a distraction as something that prevents someone from giving their complete attention to something that had their complete attention previously. Some children have attention disorders and the diagnoses for such disorders are rising. Some people may be wrongfully diagnosed with an attention disorder simply because they are not paying attention like they should, due to the increasing amount of environmental distractions. There are so many new and upgraded technologies, like Facebook apps and shopping online, that students cannot seem to keep their minds focused.

Recess and physical education are the only two exercise outlets in the history of most schools. Even as early as the 1900’s people have been talking about the social benefits of physical stimulation acquired through recess breaks. Along with social benefits, recess also has physical, emotional, and cognitive benefits. Playing outside with friends inspires creativity, endorses problem-solving skills, and increases or advances a child’s vocabulary. Recess breaks also allow the teacher time to regroup or refocus, which allows him/her to make a better connection with her students after the break. Students that have a better connection with their teacher should have better grades, because that shows that they are actually trying to do well in class. Currently, exercise has been said to increase one’s mental capabilities. Getting the adequate amount of exercise has been said to help with attention spans and decreasing disruptive behaviors. Some schools have tried different approaches to get the right amount of exercise in schools so the students will pay more attention, but they have failed to find the right balance.

There have been studies that have proven exercise or physical stimulation to be a great resource in helping students pay more attention to and comprehend class materials. Kercood and Banda (2012) demonstrate in their study, The Effects of Added Physical Activity on Performance during a Listening Comprehension Task for Students with and without Attention Problems, that with the help of added physical activity, improvements were shown on standardized test scores. The improvements shown by Kercood and Banda (2012) included task behavior and the average amount of time on tasks in functioning school aged children. According to Jacobelli (2008), Children with attention disorders could benefit from extra physical stimulation in the classroom to help them cope with their disorders by strengthening their brain functioning. Medicines to treat attention disorders have many side effects and sometimes they don’t even work, Jacobelli(2008), so allowing them to partake in physical stimulating activities would be a natural alternative way to help them better themselves. Howie, Beets, and Pate (2014) experimented with how much exercise is necessary to accomplish improved on-task behavior. They used four different approaches including ten minutes of seated classroom activity, five, ten, and twenty minute exercise breaks. After observation, they found that ten minutes of exercise increased on-task behavior the most. Suggesting that on-task behavior will increase after short, high intensity, classroom exercise breaks. Pirrie (2012) also found that there is a significant improvement on tests right after physical stimulation. Reading (2010) found that exercise is beneficial to cognitive performance, however, you have to take in consideration of the participants characteristics and modify it to the participant. Hill, et al. (2010) found that exercise did benefit cognitive performance but not on the first week, they only found improvements on the second week and after. The students seem to need time to adjust to a new school routine. Hill, Williams, Aucott, Thomson, and Mon- Williams (2011) also found that exercise benefited cognitive performance but test scores were effected by age, sex, and ADHD symptoms, however the effect of exercise wasn’t weakened by them.

A study by Bandura shows that reprimanding children for movement or fidgeting is not recommended in school aged children. Instead, children are encouraged to be active in the classroom and is being added to the curriculum. Children who can interact with their environment are much more capable of listening and comprehending material. Laury and Holt (2000) conducted a series of experiments in which games propagated learning of economics. In their study, students were given active roles or positions within a bank and were encouraged to physically move around the classroom. During the experiment, students were given money which altered their perspective of spending and economics. Students are often left to imagine many concepts instead of using or learning with tangible goods. Games that incorporate tangible items and are physically stimulating help promote increased scores on performance tests. Some may even argue that more challenging activities are required for a significant change. A study conducted by Robyn English demonstrates how “colorful semantics” can improve verbal comprehension (English, 2014). She notes that challenging activities are much more stimulating than ordinary, traditional methods of teaching

There are even theories about why children, especially with deficit disorders, need as much physical stimulation as they can get. One theory explaining why children should be given additional physical activity is the optimal stimulation theory. The theory of optimal stimulation concludes that when organisms acquire reactions which, when overall stimulation is low, are accompanied by increasing stimulation and vice versa (Zentall, 1975). This is a behavioral approach aimed to account for a “homeostatic concept” applicable to most living organisms (Zentall, 1975). Optimal stimulation is used widespread in psychology to account for behavioral problems. Certain contexts stimulate hyper excitability or hyperactivity in children who are considered brain damaged (attention disorders). Remaining in a seat for extended periods of time may cause distress in children diagnosed with attention problems more so than children without brain damage. Therefore, additional physical stimulation in the classroom is a necessity for those with attention disorders in order to see improvements on performance tests.

As a whole, the worth of additional physical activity within educational learning is pertinent to the acquisition of knowledge, especially for those with attention disorders. Throughout this proposal, the goal of this research will be to further analyze how physical stimulation in the classroom can increase learning abilities, specifically increasing academic performance in third graders. The hypothesis is that physical stimulating academic games will increase comprehension test scores by allowing the children to export excess energy so they can settle down and pay more attention in class.

Method

*Materials*

A participating school, permission slips, one-hundred third grade students, two classrooms, a video simulating a normal classroom experience, which will consist of third grade comprehension material that is approved through the state at the time of the experiment, consent forms, and a comprehension test that reflects the material learned for the previous month will be needed.

*Sample*

First, permission from Cullowhee Valley Elementary School in Jackson County, North Carolina to conduct the experiment will be needed. Then permission slips that briefly explain the need for students for a study will be send out to all parents of the third grade class. Of those that get returned signed with permission, 100 students will be randomly selected to participate. All students chosen to participate are either 8 or 9 years old. Once the participants have been chosen, appointments will be made with the parents of those students to get informed consent. The parents will be told that everything is confidential through the use of numbers instead of names and that the experiment is voluntary and the children can choose not to participate at any time. The parents and the students will be informed of the procedure but will not be informed of the exact purpose, that way, the children knowing won’t affect the outcome of the experiment.

*Procedure*

Once all students have been cleared to participate, 50 students randomly chosen will be placed into classroom A for 90 minutes a day for 5 days a week, for 4 weeks with a video simulating a normal classroom experience, which will consist of third grade comprehension material that is approved through the state at the time of the experiment. There will be two 15 minute breaks, one at the very beginning of class and another after 30 minutes of learning. During the breaks for classroom A, the video will be stopped by us and the students will only be allowed to work on homework in their seats by themselves, no talking or moving around the classroom will be permitted during this time. The class will be monitored by us to make sure the children are obedient. Once the 15 minute break is over, the video will be resumed and class will go on for another 30 minutes before the next break. The other 50 students will be placed into classroom B for 90 minutes a day for 5 days a week, for 4 weeks with the same video as classroom A simulating a normal classroom experience, which will consist of third grade comprehension material that is approved through the state at the time of the experiment. There will also be two 15 minute breaks, one at the very beginning of class and another after 30 minutes of learning. However, during the breaks for classroom B, the video will be stopped and the students will be participating in some type of physically stimulating academic game managed by us. An example would be having the students compete against each other by having them all stand while one walks past each student answering products of multiples. If the student walking misses and the other gets it right, they switch places and the “loser” goes back to his/her seat. After the 15 minute break, the students will then find their seats and the class video will be resumed for another 30 minutes before the next break. The second break will be consistent with the first, class A will do homework again and class B will participate in a physical stimulating academic game. After the second 15 minute break, the class video will resume and finish the day with the last 30 minutes of class. At the end of the 4 weeks, the same comprehension test on the material learned during the past 4 weeks will be assigned to both class A and class B. Once the comprehension test is complete and scores are collected, the students will be told the whole purpose of the study.

Results: Proposed Data Analyses

The test scores will be averaged for class A and class B, then the average scores will be compared to each other by using a T-test. The T-test will compare physical stimulation to no physical stimulation. By comparing the two average scores, we will be able to tell whether or not physical stimulation helps increase comprehension test scores. The independent variable will be the physical stimulation within the classroom and the dependent variable will be the comprehension test scores.

The hypothesis is that physical stimulating academic games will increase comprehension test scores by allowing the children to export excess energy so they can settle down and pay more attention in class

Discussion: Potential Significance of the Findings

We want to do this experiment to find a way to increase comprehension test scores. We want to find a way to keep students on task longer and to increase comprehension on course material. We think that increasing physical stimulation will increase comprehension test scores. By comparing average comprehension test scores from a group that partakes in Physical stimulation to a group that doesn’t, we would be able to prove that physical stimulation does or does not affect the scores. If a significant increase is found, physical stimulating academic games could be used in classrooms to help increase comprehension scores. Further research could determine how much time or what type of physical stimulation is needed. You might find that instructed breaks are better than free range breaks, or that a certain time frame is more suitable.

References

English, R. e. (2014). Coming to grips with grammar. Practically Primary, 19, 7-8.

Hill, L., Williams, J. G., Aucott, L., Milne, J., Thomson, J., Greig, J., & ... Mon-Williams, M. (2010). Exercising attention within the classroom. *Developmental Medicine & Child Neurology*

Hill, L. B., Williams, J. G., Aucott, L., Thomson, J., & Mon- Williams, M. (2011). How does exercise benefit performance on cognitive tests in primary-school pupils?. *Developmental Medicine & Child Neurology*

Howie, E. K., Beets, M. W., & Pate, R. R. (2014). Acute classroom exercise breaks improve on-task behavior in 4th and 5th grade students: A dose–response. Mental Health And Physical Activity

Jacobelli, F., & Watson, L. A. (2008). ADD/ADHD drug free natural alternatives and practical exercises to help your child focus. New York, NY, US: AMACOM.

Kercood, S., & Banda, D. R. (2012). The Effects of Added Physical Activity on Performance during a Listening Comprehension Task for Students with and without Attention Problems. International Journal Of Applied Educational Studies, 13, 19-32.

Laury, S. K., & Holt, C. A. (2000). Classroom Games. Journal Of Economic Perspectives, 14, 205-213.

Pirrie, A. M., & Lodewyk, K. R. (2012). Investigating links between moderate-to-vigorous physical activity and cognitive performance in elementary school students. Mental Health And Physical Activity, 5, 93-98.

Reading, R. (2010). Exercising attention in the classroom. Child: Care, Health & Development, 36, 597-598.

Zentall, S. (1975). Optimal stimulation as theoretical basis of hyperactivity. American Journal Of Orthopsychiatry, 45, 549-563.