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PEDAGOGY

Cooperative Learning in Physical Education and Its Effects on Student Reading Comprehension Scores

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Abstract

Some states require physical education (PE) to be in a school's curriculum. Some people feel that it is a time to play and it is not an important subject in a school's curriculum. This study aims to shed light on the potential effects of PE on students' performance in language arts as subject matter. The purpose of this study was to examine the effects of the cooperative learning skills used during a adventure education unit in PE on students' reading comprehension scores. This study exposed participants to adventure education classes with challenging developmentally appropriate tasks and other PE classes with nonstructured tasks. After the PE classes, the participants read a passage and answered 10 questions about the passage as related to language arts. Data for this study were placed into a Microsoft Excel spreadsheet and the averages were analyzed via a linear regression in Microsoft Excel. The results showed an increase in student reading comprehension scores for fifth grade and sixth grade on several of the

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days and the same or lower scores on other days. One limitation of the study was its length of time, which suggests that further research needs to come to a complete conclusion on the effects of cooperative learning in PE on students' reading comprehension scores.

There are still multiple barriers in the field of physical education (PE). Two of these barriers deal with the status of physical activity time required in schools and accountability systems established across the United States. According to the *Shape of the Nation Report* (Society of Health and Physical Educators, 2016), "a minority of states require school districts or schools to have a minimum weekly amount of physical activity time for students; almost one-third (32.7 percent, 16 of 49 states) require student assessment directly related to state physical education standards" (pp. 20–21). The combination of these realities, among others, makes it a problem for many physical educators to be effective in getting their students to become literate individuals in PE. This is important to note since physical educators across the United States need the instructional time and effective formal and informal assessment strategies to meet standards. The National PE Standards (Society of Health and Physical Educators, 2013) are clear in their definition of a physically literate individual in all domains.

The area of interdisciplinary PE can assist that literacy component of benchmarks in the National Standards, as well as make connections with other subject matter areas and make other teachers aware of the connection between their area of study and PE in schools. In the area of language skills, "the movement components of physical education can be used as a medium through which children are provided with opportunities to practice and strengthen language skills" (Griffin & Morgan, 1998, p. 34). Physical educators can integrate any given subject area into PE as a method to reinforce the knowledge students gain in other areas of study. However, this interdisciplinary approach needs more research into the benefits students gain from the integration of different subjects into PE. This study looked at the effects PE has on language arts as an academic subject. Its purpose was to examine the effects of the cooperative learning skills used during an adventure education unit in PE on students' reading comprehension scores and to show the effects of PE on students' academic success.

Four sections compose the literature review: (a) physical activities effects on the brain, (b) PE in schools, (c) PE and language arts, and (d) cooperative learning/adventure education.

PE covers all three learning domains. Because of this, physical activity has been researched in relation to the effects on the human brain, specifically its effect on the mind and on social skills. Knowledge from this line of research can reinforce the association of PE to the human brain, reconfirming its need in schools.

Physical activity has many benefits. Consistent physical activity can help improve and maintain thinking, learning, and judgment skills as a person ages (Centers for Disease Control and Prevention [CDC], 2011). Concerning psychological effects, studies have suggested that physical activity can increase cognitive function (Keely & Fox, 2009), whereas exercise can improve mental health and increase psychological well-being (Keely & Fox, 2009). In Keely and Fox (2009), one result showed that exercise helps maintain brain function and blood supply in the brain, as well as increases the production of endorphins in the brain and stimulates neural growth and efficiency during maturation in children (Keely & Fox, 2009).

People seem happier and some people become more productive when physically active. The neurotransmitters in the brain increase when the person exercises regularly (Chaddock, Voss, & Kramer, 2012). Participation in exercise, especially higher levels of aerobic fitness, has been associated with an increase in academic achievement (Chaddock et al., 2012). This explains why so many students enjoy an effective and dynamic PE lesson.

Concerning neurological effects, Reed et al. (2010) stated that movement can influence fluid intelligence and that fluid intelligence should be considered to promote cognitive development in elementary-age children. Fluid intelligence is defined as the "ability to think abstractly, reason, identify patterns, solve problems, and discern relationships" (Chegg Study, n.d., para. 1). Scientists at Salk Institute for Biological Studies used mice to study the effects of exercise on the brain. Their study showed mice that exercised by running produced and activated more cells in the area of the brain that controls memory than those that did not run (Reynolds, 2013). The area of the brain that controls memory is the hippocampus, in which there is a positive relationship between physical activity and

hippocampal structure and function. Chaddock et al. (2012) stated that greater-fit children were found to have larger hippocampi than the less-fit children, which suggests that exercise can increase the size of the hippocampus and its functions (Chaddock et al., 2012). Physical activity has had not only neurological effects but also physiological effects on the brain. When hippocampal function is increased, there should be an increase of memory. Memory plays a big role in students' academic achievement

With so many benefits of physical activity to overall well-being combined with the increase of obesity in children, PE holds an important role in schools (Graham, Holt/Hale, & Parker, 2007). A quality PE program guides children in the direction to become physically active for a lifetime. So many children do not get adequate physical activity outside of school (Graham et al., 2007). PE in schools allows the student to get the health benefits of physical activity, as well as gain knowledge concerning the importance of a lifetime of regular fitness. Of the major approaches to teaching PE, some programs teach students tactical skills that can be used in everyday situations. These types of programs develop modified play, which provides a developmentally appropriate environment for students. Increasing time allotted to play provides a more enjoyable and motivational experience for children (Mitchell, Oslin, & Griffin, 2003).

With all the benefits of PE in schools, it is clear why it is an integral part of the school curriculum. Even though PE programs have strong benefits, some people feel that the subject is not important enough and should be eliminated from the school schedule.

Several cross-sectional studies and intervention studies have examined the relationship between physical activity and academic achievement. The influence of U.S. elementary school PE programs on direct measures of academic achievement has been examined. Carlson et al. (2008) used data from the Early Childhood Longitudinal Study, which focused on kindergarten classes from 1998 to 1999, to examine the influence of PE programs. They used a multistage probability design to select students for the study. Results showed a small but significant benefit for academic achievement in girls with higher amounts of PE. A higher amount of PE was not positively or negatively associated with academic achievement in boys (Carlson et al., 2008).

The relationship between objectively measured and self-reported physical activity, sedentary behavior, and academic achievement has also been examined. Children from five Finland schools participated in the study and answered questions from the WHO Health Behavior in School-Aged Children study, which measures self-reported PE. Children's physical activity and sedentary behavior were measured via an ActiGraph GTIM/GT3X accelerometer. Grade point averages were collected from the education services of the city. A linear regression analysis showed the relationship between physical activity, sedentary behavior, and academic achievement. Results showed no relationship between sedentary behavior and academic performance, but a relationship between the self-reported physical activity and student GPA (Syvaoja et al., 2013)

In a literature review, the CDC (2011) examined several studies to help develop a connection between school-based physical activity and academic performance. The CDC used nine electronic databases and physical activity– and academic-related search terms to collect research articles and reports on physical activity and academic performance. The CDC also used coded data from articles to categorize studies by their physical activity context and then by the type of academic performance outcome. The results showed that through all 50 studies, there were 251 relations between physical activity and academic performance, academic behavior, cognitive skill, and attitude (CDC, 2011).

Regardless of the strength of the relationship between physical activity and cognitive skill, there is a direct association with physical activity and academic achievement. It is evident physical activities in PE influence a child's learning process. One core academic that plays a key role in a child's academic success is language arts.

English as language art studies systems and structures of language and language conventions includes grammar, punctuation, and spelling. In English, students learn how language conventions change from one context to another. Language guides visual, spoken, and written communication. This is all according to the *English Standards for Language Arts* (Gutierrez, Baquedano-Lopez, & Turner, 1997). The ability to read and comprehend information that was just read is a necessary part of a child's educational experience (Antilla, 2013).

According to Myers, "Every teacher who stands in front of a classroom faces many years of historical assumptions about how literacy should be defined. A teacher is not just teaching reading and writing, they are teaching contingent definitions and constructions of reading and writing" (as cited in Cadiero-Kaplan, 2002, p. 374). Language arts education supports all other subjects in school. If a child was unable to read, write, comprehend, and spell, all other subjects would be difficult for educators to teach. In social studies, a child must be able to read and comprehend what happened in history. Students need to be able to read and follow directions when experimenting in science class. They need to follow the instructions to solve a math problem. To go through their daily educational routine, students must be able to communicate verbally, nonverbally, or in written form. Language arts education is key to a school's educational stability and success.

In PE, any student must be able to comprehend the rules of the activities. Physical educators also use different forms of reading and writing to assess their students. Examples are journals, portfolios, written tests, and comprehension of articles to support the lesson being taught. Students need to be able to read signs explaining how to perform fitness skills at fitness stations. In a PE cooperative learning unit, communication is the key component for students to succeed in the challenges given. If students do not have the skills they learned from language arts education programs, they would have a difficult time participating in certain aspects of a PE program.

The Common Core State Standards are on the rise in schools, and PE teachers are required to incorporate language arts into their lessons. This means, depending on the physical educator and their administration, there is going to be written forms of assessment, readings, homework, and vocabulary used in PE classes. As teachers, we are responsible for the success of our students in language arts. Incorporation of language arts in a physical educator's lesson must be proven to an administrator and shown when being observed. Language arts education plays a bigger role now in many subjects than it has in the past.

Physical activity and PE have many health benefits and many benefits to improving cognitive function. With an increase in cognitive function, there is an increase in academic achievement in stu-

dents. Since language arts education plays a big role in standardized test scores and in students' overall academic achievement, several studies have focused on the effect of physical activity and PE on language arts abilities. These studies examined the four major areas of language arts (spelling, grammar, writing, and reading).

Carlson et al. (2008) examined the influence of U.S. elementary school PE programs on direct measures of academic achievement. The Early Childhood Longitudinal Study that focused on kindergarten classes from 1998 to 1999 was used for data collection. In another part of the study, the researchers focused on direct measures of academic achievement in mathematics and reading from kindergarten to fifth grade. Results showed a small but significant benefit for academic achievement in girls with higher amounts of PE. A higher amount of PE was not positively or negatively associated with academic achievement in boys (Carlson et al., 2008).

Tremarche, Robinson, and Graham (2007) determined the effect of quality PE time on Massachusetts Comprehensive Assessment System standardized scores. This standardized test was given to 311 fourth-grade students from two schools within a 2-month period. These fourth graders were tested on English and Language Arts and on Math. The results of this study showed that the mean scores from the first school were different from those of the second school in the English and Language Arts section of the test. There was no significant difference with the mean math scores between both schools. The researchers concluded that students who received more hours of quality PE received a higher score on the English and Language Arts area of the standardized test (Tremarche et al., 2007). There are several units in a PE curriculum and each affects academic achievement.

PE offers an abundance of opportunities for group involvement, leisure skills, personal commitment, risk, unique environments, and social relationships. All of these opportunities are offered throughout a PE program, but one unit offers all these opportunities and that is the cooperative/adventure education unit. A cooperative learning/adventure education unit allows students to develop outdoor sports and survival skills, live within the limits of personal ability, derive pleasure in accepting the challenge and risk of stressful situations, develop awareness of dependency on themselves, share experiences

and learning in cooperation with one another, and develop problem-solving skills (Kelly & Melograno, 2004).

Adventure education programming turns PE classes into an adventure for students. A sense of adventure exists for the students as long as the element of surprise exists within the activity. These activities entice students into performing tasks that they have never imagined possible (Faulkingham Hunt, Kohut, & Rheingold, 2003). The sense of adventure includes challenges at moments when students are on the brink of both success and failure (Faulkingham Hunt et al., 2003).

Physical educators and classroom teachers can use an assortment of cooperative learning activities and adventure curriculums. One adventure curriculum that is most commonly used among physical educators was developed by an international nonprofit organization call Project Adventure. According to Faulkingham Hunt et al. (2003), if students participate in a Project Adventure curriculum, they will be able to (1) demonstrate an understanding of movement concepts and the use of motor skills; (2) demonstrate responsible personal and social behavior; (3) demonstrate the ability to use effective interpersonal skills; (4) demonstrate the ability to use the decision-making skills of appropriate goal setting, risk taking, and problem solving; (5) understand that challenges, enjoyment, creativity, self-expression, and social interaction are important, life-enhancing experiences; and (6) demonstrate an understanding of and respect for differences. These six learning objectives of the adventure curriculum closely align to the National PE Standards (Society of Health and Physical Educators, 2013).

In a cooperative learning/adventure education unit, students are given an assortment of tasks and work together to solve the problem and achieve the task. This requires students to use a higher order of thinking. This unit affects learning because students develop different ways of thinking and enhanced problem-solving skills. These problem-solving skills can be used in life and in other educational situations. Problem-solving skills can be used in a variety of academic subjects, one of which is language arts. Some language arts abilities allow for communication and help a child develop social skills.

Whether PE has a slight effect or a significant effect, the program improves students' language arts abilities. The effects can be

shown through a student's standardized test score or educational action plan, a plan created by classroom teachers to show a student's growth in specific academic subjects. If a classroom teacher and a physical educator collaborated, evidence would show improvement in students who have more PE than those who have less PE.

Physical activity and PE can affect learning when cognitive function increases. When learning is affected, the area of language arts is also affected. Language arts abilities play a key role in a student's academic achievement. With these playing such a key role in a student's educational success, it is important for educators to find ways to improve students' language arts abilities. The effects of a PE program, whether big or small, have been shown to increase and improve language arts abilities. Evidence of these effects can be seen through standardized test scores and a student's educational action plan. This evidence shows that physical activity, PE, and a healthy lifestyle can have a significant effect on a student's educational success, and that will lead to an increase in a student's language arts skills and reading comprehension scores.

Method

Participants and Settings

This study was designed and applied at an elementary school in northern New Jersey. This small school has about 150 students and is located in a rural area of New Jersey. The participants were male and female students aged 10 to 12 years. Two groups of students participated in the study. One group of fifth graders consisted of 20 participants and one group of sixth graders consisted of 13 participants. Multiple formsfor conducting the study were submitted to different individuals. Approvals were received from the principal of the school, the superintendent of the school district, and the board of education of the school district. Once approval was granted, the researcher distributed active consent and assent forms for the administration of the school, the participants, and their parents/guardians. All active consent and assent forms were received by the researcher with signatures from the school's administration, the participants, and their parents/guardians, allowing their participation in this study. Due to the participants being children, parent/guardian permission was needed.

Achieve 3000 reading levels were obtained from the fifth- and sixth-grade teachers. This information was gathered so reading passages and questions were collected to match each participant's reading level. As mentioned, all reading passages and questions were gathered from ReadWorks (2016). The fifth-grade data collection was conducted for 2 weeks in December 2016 and the sixth-grade data collection was conducted for 2 weeks in January 2017.

Data Collection

During the 2 weeks for data collection of each grade, the participants had PE eight times and each class was 45 min long. The classes consisted of 30 min of activity and 15 min of assessment. Each PE class alternated between a low structure, low thinking PE class and a high structure, high thinking PE class.

The low structure, low thinking PE classes consisted of recreational physical activities. Those recreational activities included using a Hula Hoop, jumping rope, shooting a basketball, kicking and passing a soccer ball, and throwing a football with a partner. On these days, the researcher had the participants enter the gymnasium and instructed them to warm up and stretch out on their own. After the warm-up, the participants chose a recreational activity to do that day. For safety reasons, the researcher designated specific areas of the gym for each recreational activity. After the allotted PE class time, the participants were instructed to line up to leave the gym and travel back to their classroom. Once participants were back in the classroom, the researcher passed out a reading passage and questions to participants based on their reading level. Once finished, participants handed their reading passage and answers to the researcher.

The high structure, high thinking PE classes consisted of planned adventure education activities. These activities were adopted from Project Adventure textbooks. All of the activities chosen from these textbooks were grade appropriate. On these days, the researcher had the participants enter the gymnasium and go to their warm-up spots. The researcher conducted the warm-ups and stretches on these days and then explained the activity and its rules to the participants. The participants were given a specific amount of time to discuss their strategy to solve the challenge given to them and were allowed to perform the strategy created. While participants performed the activity, the researcher gave verbal cues to remind the participants of

the activity rules. After each round of the activity, or if the researcher saw the participants struggling, he would have the students stop and discuss what was and was not working. The researcher focused on three main skills: teamwork, communication, and thinking about all solutions that can be used to solve the problem. How can they improve what they are doing? At the end of the activity, the participants would go back to their warm-up spots and discuss the activity with the researcher. What could have been done differently? What worked to solve the challenge given to them? At the end of the allotted PE class time, the participants were asked to line up to leave the gym. The reading passage and questions were done in the classroom and the same procedure as the low structure, low thinking reading passage days was conducted.

The answers to the reading passage questions were graded by the researcher on the same day the participants completed them. The scores were recorded in a Microsoft Excel spreadsheet. The researcher used answer sheets supplied by ReadWorks (2016) to grade questions for each passage.

Variables

In a study of this nature, a variety of uncontrolled variables could affect the results. The physical, social, and emotional states of children are always changing, especially in a school setting. These changes are greater with the age group in this study due to increase of hormone levels caused by puberty. These constant changes could affect students' focus throughout the school day and reading comprehension scores.

Another variable is the changes throughout the school day. As teachers, teachers need to be prepared for any changes that could happen throughout the scheduled school day. Emergency drills, disruptive students, assemblies, delayed opening, and sudden schedule changes are some of those changes. These changes have an effect not only on teaching but also on the students.These changes can influence their focus, attitude, and behavior, which can affect reading comprehension scores.

The uncontrolled variable that could affect the results of this study is the instruction of the classroom teacher. The classroom teacher is required to teach two periods every day of language arts and within those two periods reading comprehension could be a focus. With

this variable being recognized, are cooperative learning activities in PE truly affecting students' reading comprehension scores or are they just supporting the skills being taught by the classroom teacher? This variable could be ruled out if the classroom teachers were to not teach language arts during the study and not have the students read throughout the school day. This would be a challenging task for a researcher and a school district. A suggestion is for such a study to be performed during the summer months, when the classroom teacher is not teaching the students. A summer PE program would need to be developed for this suggestion to be executed.

Results

During this study, the researcher asked the classroom teachers to help him observe the attitude and focus of the students when students took the reading comprehension assessments. The researcher asked this after observing a change in the students' behavior, attitude, and focus on low structure, low thinking days compared to high structure, high thinking days.

At the end of the 8 days of data collection for the fifth and sixth grades, the researcher sat down with the classroom teachers to discuss what they observed during the reading comprehension assessments. There are two classroom teachers for each grade in the school where the study was conducted. All four classroom teachers and the researcher observed an increase in most of the students' focus on the days of the cooperative learning activities.

On the cooperative learning days, after the PE class the students entered the class ready to take the assessment. They grabbed their folder with their student number on it, sat at their desk, and quickly began to complete the assessment for that day. While the students were taking the assessment, it was observed that they were focused and concentrating on the task at hand. More students were seen looking back at the text to help them with an assessment problem. This is a problem-solving strategy taught to the students by the classroom teacher to help with reading assessments. It was also observed on these days that the students took a slightly longer time to complete the assessment and the researcher noticed that the students wrote more for the writing questions in the assessment.

On the recreational activity days, after PE class the students did not seem ready to take the assessment. Several students asked to use

the bathroom before the assessment, students were walking around the classroom before they sat down, and there was some confusion on some of these days caused by students forgetting their student number. This was different on the cooperative learning days, when the students remembered their student numbers and quickly sat down to take the assessment. While taking the assessment, many students slouched down in their seats and stared off into space. The assessments were handed in quicker and some students wrote less for the writing questions in the assessment.

This study started with 35 participants, but as the study went on two participants' data were removed due to the number of absences and injury, which occurred outside the study. This caused the number of participants to drop to 33 children (20 fifth graders, 13 sixth graders).

Table 1 shows the average reading comprehension scores per grade and per day of activities. There was an increase in students' reading comprehension scores for fifth grade between Days 1 and 2, 5 and 6, and 7 and 8 of low and high structure/thinking days. Furthermore, there was an increase in scores for sixth grade between Days 1 and 2, 3 and 4, and 7 and 8 for low and high structure/thinking days. Figure 1 shows a decrease in students' reading comprehension scores between Days 5 and 6 for sixth grade and no change in reading comprehension scores between Days 3 and 4 for fifth grade. On the days when there was a decrease or no change in reading comprehension scores, it is believed that the uncontrolled variable of a student's emotional state could have affected the scores on that day. Those scores could have been affected by the level of thinking and effort the students put into the activity on that day. Table 1 shows that some students' reading comprehension scores increased between low and high structure/thinking days and other students' scores decreased between low and high structure/thinking days.

Table 1
Reading Comprehension Scores After Low and High Structure/ Thinking Activities in Physical Education Class

		Day							
		1	2	3	4	5	6	7	8
Student	Grade	Low	High	Low	High	Low	High	Low	High
1	5	60	100	90	80	100	90	90	60
2	5	80	80	70	60	40	60	70	60
3	5	80	50	80	100	100	80	90	80
4	5	50	90	50	80	90	80	80	100
5	5	60	90	90	80	80	80	80	90
6	5	60	60	70	80	30	40	20	80
7	5	100	70	80	70	60	90	90	70
8	5	100	90	100	100	100	100	70	90
9	5	100	90	80	80	90	90	70	70
10	5	80	70	80	80	50	90	60	60
11	5	80	100	90	90	80	100	60	100
12	5	90	70	80	90	70	40	90	60
13	5	50	90	60	60	40	70	60	50
14	5	70	90	80	80	90	90	90	100
15	5	80	100	100	90	100	100	100	100
16	5	40	80	30	80	40	80	40	80
17	5	50	100	70	20	60	80	90	30
18	5	100	30	70	60	90	90	80	60
19	5	70	60	80	90	80	70	60	70
20	5	80	70	100	90	100	80	80	90
Average	5	74	79	78	78	75	80	74	75

Table 1 (cont.)

		Day							
		1	2	3	4	5	6	7	8
Student	Grade	Low	High	Low	High	Low	High	Low	High
21	6	100	100	90	100	100	90	100	100
22	6	90	100	100	80	100	100	100	100
23	6	90	100	90	70	80	100	90	80
24	6	80	90	70	80	80	70	80	100
25	6	90	90	90	70	70	70	60	90
26	6	80	100	100	100	90	100	100	90
27	6	50	60	50	70	70	70	70	30
28	6	80	100	90	100	80	70	90	80
29	6	50	70	60	60	60	50	70	60
30	6	70	80	60	100	100	90	100	80
31	6	100	100	80	100	90	100	70	90
32	6	60	90	40	80	90	70	90	100
33	6	90	80	70	90	70	80	60	90
Average	6	79	89	76	85	83	82	83	84

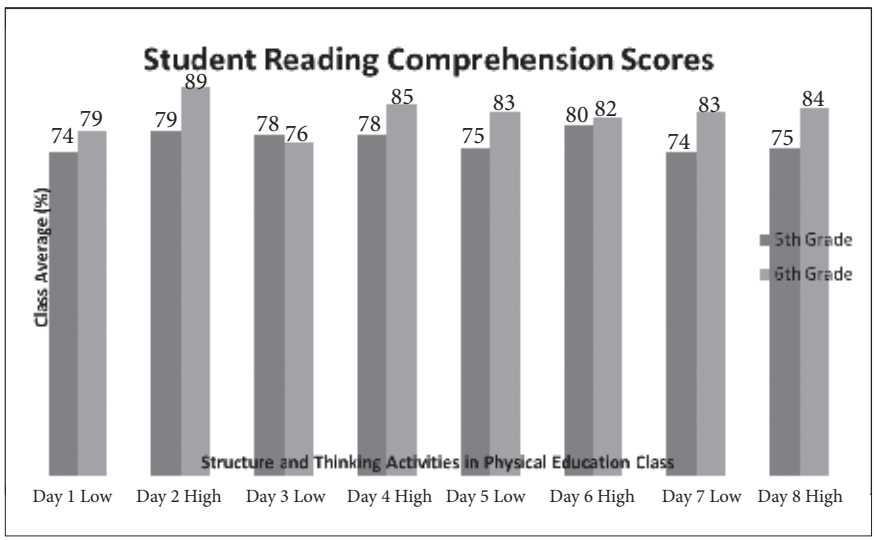

Figure 1. Class average of students' reading comprehension scores after high and low structure/thinking activities in physical education class.

Discussion

The purpose of this study was not to attempt to resolve the barriers of limited instructional time and application of assessment strategies in PE. The study attempted to show how high structured PE can positively affect the cognitive domain in students via interdisciplinary PE. The simple coordination of language arts content and cooperative learning in PE increased the reading comprehension scores of the participants. Even though the study has limitations, it was evident that the participants showed improvements in reading comprehension scores after a high thinking, problem-solving PE class. The increase in reading comprehension scores could be due to the increase in brain activity during the PE classes and due to the practice of problem solving during the activities.

According to the literature, consistent physical activity can help improve and maintain thinking, learning, depression, and judgment skills. Research also shows that specific exercise can increase mental health by increasing blood flow to the brain. When there is a constant blood flow, it helps maintain thinking (CDC, 2011). An increase in student focus was observed during this study, which could also lead to an increase in reading comprehension scores. Reed et al. (2010) stated that movement can influence fluid intelligence. Fluid intelligence is defined as the "ability to think abstractly, reason, identify patterns, solve problems, and discern relationships" (Chegg Study, n.d., para. 1).

On the days when there was a decrease or no change in reading comprehension scores, it is believed that the uncontrolled variable of a student's emotional state could have affected the scores on that day. A child's and adult's emotional state changes day by day due to multiple variables. The researcher observed on the days of no change and decreased reading comprehension scores students' attitude toward the study and activity was different from the other days. The students seemed to put less effort into the activity during the PE time. This could be due to students' interest level in the activity on that day. Some students sighed or complained about having to take an assessment on that day.

Conclusion

PE in schools allows students to gain the health benefits of physical activity, as well as knowledge concerning the importance of a lifetime of regular fitness. PE programs teach students skills that can be used in everyday situations. Examples of these skills are teamwork, problem solving, and communication. These types of programs develop modified play, which provides a developmentally appropriate environment for students. Increasing time allotted to play provides a more enjoyable and motivational experience for children (Mitchell et al., 2003).

This study focused on the cooperative learning skills that students learned during the adventure education unit in PE class and how the students applied those skills to a reading comprehension assessment. The data showed that the class average of the students' reading comprehension scores increased on the days of the higher level thinking and higher structured activities (cooperative learning activities). It was also observed that students' focus was greater on the higher thinking and higher structured days.

In many schools, the aforementioned barriers could be difficult to change and/or overcome. However, even when available PE instructional time is minimal, physical educators can still find ways to use that time effectively to meet physical activity standards. The cognitive domain was evident in the interdisciplinary version of this study. The application of interdisciplinary PE is another method to maintain the quality of PE lessons and to continue working toward the education of physically literate individuals. Nevertheless, further research is needed on the effects of cooperative learning in PE on students' reading comprehension scores over an extended time.

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