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THE EFFECTS OF THE ONLINE GAME KAHOOT ON SCIENCE VOCABULARY ACQUISITION

by

Joseph Pede

A Thesis

Submitted to the
Department of Interdisciplinary and Inclusive Education
College of Education
In partial fulfillment of the requirement
For the degree of
Master of Arts in Special Education
at
Rowan University
May 10, 2017

Thesis Chair: Dr. Amy Accardo

Dedications

This thesis is dedicated to my mother, Kathleen Pede, for your constant support and always believing in me. And in memory of my father, Joseph A. Pede, for always encouraging me to do my best.

Acknowledgments

I would like to express my thanks to Professor Amy Accardo, Ed.D. for her patience, guidance, and support during the research and writing process. I would also like to thank my fiancé Katie for putting up with me through all the nights of writing and editing.

Abstract

Joseph Pede
THE EFFECTS OF THE ONLINE GAME KAHOOT ON SCIENCE VOCABULARY ACQUISITION
2016-2017
Amy Accardo, Ed.D.
Master of Arts in Special Education

The purpose of this study was to investigate the effect of the online game Kahoot on science vocabulary acquisition of students with learning disabilities in a middle school inclusion physical science classroom. Specifically, this study investigated (a) student science vocabulary acquisition, (b) student focus and on task behavior, and (c) student satisfaction using the online game Kahoot. Vocabulary acquisition was measured in terms of weekly vocabulary assessments. Six middle school students, three males and three females, participated in this study. A single subject design with ABAB phases was utilized. Results show that all students increased their vocabulary assessment scores when Kahoot was played twice weekly. The use of Kahoot also increased student focus and on task behavior. The results of the student satisfaction survey indicated that students enjoyed playing Kahoot and found it easy to use.

Table of Contents

Table of Contents (Continued)

List of Figures

List of Tables

Chapter 1

Introduction

The use of academic vocabulary terms is essential to physical science education. Many of the science terms that students are expected to learn are unfamiliar to them as they are used specifically in fields of science and may have different meanings than in everyday life (Carrier, 2013). Acquisition of these vocabulary terms is important and students must be able to communicate using scientific concepts as they move through their educational career. The ability to effectively use science vocabulary terms has been found to have a large influence on student success in future science classes at higher grade levels and in post-secondary education (Shore, Ray & Gooklasian, 2015). Vocabulary games (Noemi & Maximo, 2014), repetition (Webb, 2007), and word walls (Jackson & Narvaez, 2012) are effective instructional strategies for increasing student vocabulary acquisition. The online game Kahoot satisfies all of these practices. It serves as a formative assessment review, it is repetitive in a sense that it can be repeatedly played over and over, and it serves as a virtual word wall as the vocabulary terms can be prominently displayed on the smart board (Dellos, 2015).

Student difficulty acquiring academic vocabulary is an issue across the country and in every subject taught in schools (Wright & Peltier, 2016). The use of academic language in physical science classrooms may be especially difficult for students with learning disabilities in middle school inclusion classrooms. Students with learning disabilities often struggle with word recognition and fluency while reading scientific texts (Kaldenberg, Watt, & Therrien, 2015). They go on to explain how students with disabilities are increasingly expected to make adequate progress through the same

curriculum as their non-disabled peers (2015) by reading and comprehending scientific text. Students who struggle with pulling meaning from words are at a distinct disadvantage on standardized proficiency assessments (Kennedy, Deshler, & Lloyd, 2015). One potential cause for the lack of science vocabulary retention over any other content area is the fact that science vocabulary terms are rarely used or found in any other school content area (Scafidi-Iannone, 2012). For example, the laws of thermodynamics or the principles of kinematics are not likely to ever come up in a history or language arts class. Since a student's only major exposure to science vocabulary may be within a science classroom, it makes retaining science vocabulary and using science vocabulary in spoken or written language difficult for students with learning disabilities. Scafidi-Iannone (2012) reports that word frequency affects retention. Words, to which learners are regularly exposed, are better recognized and retrieved in production (Scafidi-Iannone, 2012). Therefore, the more students are exposed to content-specific vocabulary, the better the chances are of students retaining that vocabulary (Scafidi-Iannone, 2012).

Students with learning disabilities may have difficulty understanding new words without repeated exposure to those words (Steele & Watkins, 2010). Steele and Watkins (2010) further report that students with learning disabilities struggle with pronunciation of new words and with understanding the semantic features of vocabulary terms that they are exposed to. There is evidence to support correlation between a student's vocabulary knowledge and their success in reading comprehension as they age (Beach, Sanchez, Flynn, & O'Connor, 2015). This correlation points out the need for explicit direct vocabulary instruction for students with learning disabilities (Beach, et al., 2015). Seifert & Espin (2012) conducted a study that investigated the effects of direct vocabulary

instruction interventions on science vocabulary knowledge with students with learning disabilities. They found that direct vocabulary instruction of science content had a positive effect on the students' vocabulary knowledge (Seifert & Espin, 2012).

Abrams and Walsh (2014) found that using technology-based games for vocabulary instruction increased student vocabulary assessment scores from a low B average before the game was played to a low A average. Yip and Kwan (2006) investigated the effects of online games on student focus during vocabulary instruction. They found that the experimental group outperformed the control group on vocabulary assessments (Yip & Kwan, 2006). Similarly, Hung, Yeh, and Chiang (2016) investigated the use of digital flashcards for English vocabulary instruction. They found that students who used the digital flashcards showed larger growth between pre-test and post-test than students who did not use the digital flashcards (Hung, Yeh, & Chiang, 2016). Furthermore, Huang (2015) investigated the effects of using technology to teach vocabulary words. Results reveal that students who were taught vocabulary terms with technology outscored their peers on who learned vocabulary though traditional methods (Huang, 2015).

Furthermore, there is evidence that students with learning disabilities inherently struggle with time on task behavior (Harris & Cancelli, 1993). Technology-based instructional strategies may help to increase student self-monitoring for time on task during instructional periods (Wills & Mason, 2014). Traditional methods for teaching science vocabulary may fail to engage students with learning disabilities because of the word complexity and phenomenological constructs (Marino, Gotch, Israel, Vasquez, Basham, & Becht, 2014). Vocabulary instruction through video games provides the

opportunity for repeated exposure to complex vocabulary in a way that holds the attention of all students, including students with learning disabilities (Marino, et al., 2014). As a result of their findings, Marino and colleagues report that the use of video games increases the engagement of students with learning disabilities. Technology based instructional strategies also show promise in increasing outcomes for students with autism spectrum disorder (ASD). Mineo, Zeigler, Gill, & Salkin (2009) suggest that using electronic screen multimedia may increase student engagement because the computer screen is a constrained area for the students to focus on. This constrained area of focus eliminates irrelevant stimuli from the surrounding areas that may be distracting to students with ASD (Mineo, Zeigler, Gill, & Salkin, 2009).

The online game Kahoot has the potential to serve as an interactive technology-based instructional tool that may increase student retention of science vocabulary terms. Kahoot allows educators to create surveys and game-based quizzes that they can join using a pin number (Johns, 2015). The students select answer choices on a personal device such as a Chromebook, laptop, or smartphone that coincide with questions that are displayed on the smartboard (Johns, 2015). Students are able to play the games without needing an account username (Dellos, 2015), and create a nickname that will be displayed during the game (Johns, 2015). Furthermore, Kahoot quiz game questions may include multimedia visuals such as pictures and videos to further engage students (Dellos, 2015) and students get to earn points for answering questions correctly and quickly.

Statement of Problem

Vocabulary retention and vocabulary comprehension for middle school students with learning disabilities is particularly prominent in science classrooms (Shore, Ray &

Gooklasian, 2015). Students are expected to learn and correctly use science vocabulary for longer periods of time. Linn and Chiu (2011) point out that science assessments ask students to memorize facts instead of understanding scientific concepts and processes. They also suggest that altering the way science terms and concepts are taught can have profound improvements on a student's ability to become lifelong learners (Linn & Chiu, 2011).

Significance of the Study

The use of technology for instructional purposes in the classroom has been steadily increasing over the last few years. Moreover, using technology to increase student achievement and to address areas where students typically struggle has been a focus of school leaders (Dalton & Grishom, 2011). Technology-based instructional strategies may capture the interest of students and provide scaffolds and contexts in which students can learn academic language more proficiently (Dalton & Grishom, 2011). Kahoot is a technology-based instructional tool with limited research conducted to date within the classroom setting. Finding a link between its use and students' vocabulary retention may have positive implications on teaching and learning vocabulary, specifically in the science classroom. Through this study I hope to investigate the effectiveness of the online game Kahoot as a tool for increasing vocabulary acquisition for students with learning disabilities.

Purpose of Study

The purpose of this study is to investigate the effectiveness of the online game Kahoot on the science vocabulary acquisition and focus of students with learning disabilities in a middle school inclusion physical science classroom. This study will look

at student scores on weekly vocabulary assessments and consider if the use of the review game increases student scores on the assessments over time. The study will also investigate the effectiveness of using Kahoot to increase student focus and time on task. Finally, the study will investigate if students are satisfied with the use of Kahoot.

Research Questions

Research questions for this study are as follows:

1. Does playing Kahoot on a weekly basis increase the vocabulary assessment scores of students with learning disabilities in a middle school inclusion physical science classroom?
2. Does playing Kahoot increase the focus and attention of students with learning disabilities in a middle school inclusion physical science classroom?
3. Are students satisfied with the use of Kahoot?

Chapter 2

Review of the Literature

Studies show that technology can be used in the classroom to improve student vocabulary retention (Siegle, 2015; Dellos, 2015; Dalton & Grisham, 2011). The need for improvement in student science and math scores has been a recent focus of educators (Shore, Ray, & Gooklasian 2015). Although there has been an increased emphasis on STEM education, which includes math and science, student academic achievement in science has not been substantial (Shore et al., 2015). In fact, student scores in science have not measurably changed over the last twenty years while student scores in mathematics have improved over the same period of time (Shore et al., 2015).

Vocabulary Instruction in Science

In content areas such as science, students are regularly confronted with new vocabulary terms. A student's success in science class may be dependent on their ability to comprehend and use uncommon vocabulary terms (Cohen, 2012). If a student is unable to comprehend science vocabulary, they are unable to make connections to underlying science concepts (Cohen, 2012). When students read words that they do not understand but have previously learned, they begin focusing on specific word meaning rather than information processing (Cohen, 2012). Moreover, students are likely to have difficulty in science class if they do not have a working knowledge of how to pull information out of text. Being able to read information and derive meaning from new vocabulary terms is essential, and providing vocabulary strategies to students who struggle with science vocabulary may increase their overall academic science outcomes (Shook, Hazelkorn, & Lozano, 2011).

Students with Learning Disabilities in the Science Classroom

In science classes, teachers need to account for the specific needs of students with learning disabilities and their abilities to read and comprehend scientific text (Mason & Hedin, 2011). Scientific text differs from narrative text in that it is typically written in an expository prose (Mason & Hedlin, 2011). Additionally, the complexity of the information that is contained in readings and the vocabulary that is included in the texts makes science texts the most difficult texts that students with learning disabilities will encounter in school (Mason & Hedlin, 2011). The difficulty of the texts may cause students with learning disabilities to struggle maintaining focus while reading for extended periods of time, struggle completing assignments, and struggle studying for tests (Steele, 2008).

Furthermore, it is important to increase a student's internal belief in themselves and their capabilities as a student when a diagnosed disability may make sustained motivation difficult (Grumbine & Alden, 2006). By creating a positive attitude with students with disabilities, teachers are likely to enhance the learning experiences that the students have within science classrooms (Grumbine & Alden, 2006). However, many students with learning disabilities still struggle with science content in general education settings where they are exposed to general education science curriculum (Fitzgerald, 2009).

Technology and Teaching Vocabulary

Technology is increasingly being used in the classroom for instruction. As schools move forward into the digital age it is appropriate that educators incorporate technology into their classrooms wherever possible (Huang, 2015). This includes vocabulary

instruction. Technology allows students to improve their literacy skills, use vocabulary strategies, and increase their content knowledge.

Students who do not have a clear understanding of the vocabulary terms that they read in the science classroom may have difficulty with content (Young, 2005). By using vocabulary strategies that include inquiry, teachers can help students make better connections between the vocabulary words that they read and their real-world definitions (Young, 2005). WebQuests fall into this category of inquiry learning. WebQuests are inquiry-based learning activities where the students navigate websites that are chosen by the teacher (Subramaniam, 2012). The students piece together information on a content specific topic through an active online investigation (Subramaniam, 2012). The main goal in using WebQuests is to get the students using their critical thinking skills to solve problems while simultaneously learning content and vocabulary (Subramaniam, 2012).

Furthermore, students may struggle with science vocabulary because it is not often used in everyday language. Academic science vocabulary also contains terms that may be used in everyday language but have different technical meanings when used in the science classroom (Aronin & Haynes-Smith, 2013). A study conducted by Aronin and Haynes-Smith shows that using PowerPoint flashcards to review science vocabulary may increase students' vocabulary knowledge. Their team created flashcards with every science vocabulary term from the vocabulary list on Florida's science standardized test. The students saw a progression on a PowerPoint presentation. The progression started with the vocabulary term, then progressed to an image mnemonically related to the term, and finally the definition of the vocabulary term, and led to increased student vocabulary outcomes (2013).

Consistent with the positive results of Subramaniam (2012) and Aronin and Haynes-Smith (2013) using technology based instruction to increase student vocabulary, Huang (2015) investigated the effects of using technology combined with traditional methods of teaching vocabulary with positive outcomes. Huang conducted a study with forty second grade students. The students were enrolled in two separate classes. One class was used as the control and the other class received the intervention. Quantitative data was collected in the form of a pretest and a posttest. The researcher used PowerPoint to provide vocabulary interventions to the experimental group. The interventions included simple sentences, rhymes, and short stories that included animations and sounds. The use of technology significantly increased student vocabulary scores from pretest to posttest. The study of forty students suggests that the students who received vocabulary instruction with technology scored significantly better than the control group which received vocabulary instruction through traditional paper-pencil and textbook methods (Huang, 2015).

There are many varieties of technology to use, and it is reasonable for teachers to use online media applications as technology-based instructional strategies in the classroom (Hung, 2015). Another technology-based instructional strategy is content acquisition podcasts (Kennedy, Deshler, & Lloyd, 2015). Kennedy et al. (2015) conducted a study to look at the effects of using content acquisition podcasts for vocabulary acquisition with students with learning disabilities. Participants included 278 high school students from an urban area high school. The students ranged from freshmen to seniors and were divided into students who have learning disabilities related to reading and students who do not have disabilities related to reading. The students were then

divided randomly into four experimental groups. Each group received different multimedia-based vocabulary instruction through podcasts. The results of the study showed that the students who received evidence-based multimedia vocabulary instruction outperformed the students who received multimedia instruction but not through an evidence-based model. This outperformance was true of students with and without learning disabilities (Kennedy, Deshler, & Lloyd, 2015).

Students who are interested and engaged in the classroom have a desire to know more about the words that they read (Wolsey, Smetana, & Grisham, 2015). Electronic or technology-based instruction can be used by teachers to increase student interest in words as well as to develop their vocabulary (Dalton & Grisham, 2011). Dalton and Grisham (2011) suggest that using technology to teach promotes active learning and interest in words. Technology can be flexible enough to differentiate instruction based on student need and interest. This in turn may promote vocabulary acquisition (Dalton & Grisham, 2011).

Gamification

The process of using video games to engage audiences, solve problems, and/or elicit game-like thinking and mechanics is called gamification. This is a relatively new term that was created from the use of interactive games for teaching in the classroom. Video games can be used for instruction, review, and formative assessment in schools. Using games in class can promote independent learning, collaborative learning, and problem solving. While the use of video games to teach vocabulary is new, there is research to support that it is a useful instrument to increase student vocabulary. For example, Abrams and Walsh (2014) found that when combined with traditional offline

resources, online video games helped students acquire vocabulary knowledge (2014). One online game, Kahoot, and its effects on student science vocabulary acquisition, will be the focus of this research paper.

Using Kahoot in the Classroom

Kahoot is an online game that tests student's knowledge of course content. The game is free for both teachers and students, and simply requires a multimedia tool to participate (Siegle, 2015). A cellphone, laptop, or Chromebook works for running the Kahoot website. Teachers can create quizzes using multiple choice questions presented in a game-based format to students. The quizzes contain questions that have up to four possible choices, and questions can contain various multimedia contents such as pictures or videos (Siegle, 2015). On top of the number of answer choices, Kahoot also provides teachers with the ability to select the amount of time that the students have to respond to each question (Siegle, 2015). The students join the game via a specific generated game code and are able to create their own nicknames to be displayed on the game screen. If a name is inappropriate for school use the teacher can simply click on the name and the student is kicked out of the game (Siegle, 2015).

Furthermore, Kahoot is easy to use in its game-like format and is gaining popularity across the country (Singer, 2016). Singer (2016) reports that of the approximate 55 million elementary and middle school students in the United States, about 20 million of them are using Kahoot to some extent. Kahoot uses educational trends to capitalize on their popularity. These educational trends include gamification and student engagement. The makers of the video game rely on student engagement and interest to keep the popularity of the game spreading (Singer, 2016).

One possible drawback of the popularity of Kahoot is the concern that students will begin to get bored of playing the game (Wang, 2015). Wang (2015) looked into the effect of playing Kahoot in class daily and how it may affect the interest of the students, perceived learning, and classroom dynamics. The study was conducted on 126 university students. The researcher conducted and collected data from two cases. The first case used Kahoot once after a 45 minute lecture. The second case used Kahoot after every lecture for an entire semester. The study found that the daily use of the online game had no effect on the classroom dynamics, student engagement, or student motivation. In fact, the study showed that 57% of the 126 students who participated in the study said that they would like to continue to play Kahoot after every lecture and 75% of the students felt that they learned something from playing Kahoot (2015).

Using Kahoot for Vocabulary Instruction

Kapuler (2015) listed Kahoot as one of the top 100 new online apps to use in the classroom. Kahoot came in at number 36 on the list of apps rated for their effectiveness and usefulness for teaching and/or assessing students in the classroom (2015). This information suggests that Kahoot may be an effective tool for vocabulary acquisition.

Kahoot is a relatively new online tool and as a result there is limited research on the effect of Kahoot in the classroom, and a lack of evidence for its effectiveness as a tool to teach content vocabulary. Kahoot does fall into the category of an online game, and, there are, however, numerous studies about the effectiveness of using other online games to teach content vocabulary (Huang, 2015; Hung, 2015; Wolsey, Smetana, & Grisham, 2015; Dalton & Grisham, 2011; Walsh, 2014). Yip and Kwan (2006) conducted a study and found that using video games to teach in the classroom could capture a learner's

attention better than traditional methods. This in turn may lead to better vocabulary acquisition if the online games are used for vocabulary instruction. The study focused on 100 students who used web-based vocabulary instruction that included games. They found that after learning vocabulary with the websites that included games, they experimental group outperformed the control group on the vocabulary post-test (Yip & Kwan, 2006). Results of this study suggest that Kahoot may be an effective tool for vocabulary instruction.

Moreover, Abrams and Walsh (2014) suggest that students may enjoy leaning vocabulary through gamification because online games tend to flow better than traditional textbook methods, and tend to have a predictable sequence of play as well as real time feedback. Online games usually have a point based scoring system that flows through the game from beginning to end. This flow may enhance a student's overall playing and learning experience (Abrams & Walsh, 2014).

Su and Cheng (2015) conducted a study to investigate the effectiveness of using a gamified approach to influence science learning. The study included three classes of Taiwanese students, all taught by the same teacher. Each class was used as a separate data group: two control groups and an experimental group. The experimental group received instruction using a game-informed learning approach. The results of the study showed that using gamified technology to teach science topics improved the learning performance and motivation of students (Su & Cheng, 2015). When surveyed, the students who used the gamified instructional tools stated that they enjoyed how they were able to control the pace of the activity and that the gamified activity met their expectations (Su & Cheng, 2015).

Conclusion

Studies conducted by Abrams & Walsh (2014), Huang (2015), Hung (2015), Wang (2015), Yip & Kwan (2006), Kennedy, Deshler, and Lloyd (2015), and Su and Cheng (2015) indicate that the use of technology such as multimedia online games are effective in a variety of classrooms, suggesting Kahoot may be used to increase the vocabulary acquisition of students with learning disabilities in the science classroom. Using online games in the classroom appears to provide added benefits for students such as increased focus and better class participation. The fact that science vocabulary is uncommon and new to a student creates the need for enhanced vocabulary instruction (Cohen, 2012). The use of the online game Kahoot is one of the ways that teachers may be able to enhance vocabulary instruction for students. This study investigates the effects of Kahoot on the vocabulary acquisition of students with learning disabilities in a middle school inclusion physical science classroom.

Chapter 3

Methodology

Setting and Participants

This study included six eighth grade middle school students. The students attend a middle school in a central New Jersey suburban school district. The district is comprised of eight schools in total: one early learning center, five elementary schools, and two middle schools. The school district is classified as being is District Factor Group "I," which indicates the socioeconomic in the community is upper middle class. The middle school where this study was conducted has 930 students enrolled in grades six through eight. The typical school day at the middle school runs for six hours and fifty five minutes. The amount of actual instructional time is five hours and thirty six minutes.

According to the New Jersey Performance Report (New Jersey Department of Education, 2014), 64.6% of students in the middle school are White, 30.5% are Asian, 2.2% are Hispanic, 1.5% are Black, and 0.5% are American Indian. English is the primary language spoken with less than 0.6% of the students speaking Hindi, Telugu, Russian, and Gujarati. One hundred seventeen of the 930 students in the middle school receive special education services.

The special education students participating in this study all have a specific learning disability diagnoses. They all receive special education services as outlined by their individualized education plans. The classroom where these students receive science instruction is an ICR class with fourteen total students. The general education teacher is a male who has been teaching in the district for four years. The special education teacher is a female who has been teaching in the district for three years. The class is instructed in a

co-teaching style and both teachers interact with all of the students on a regular basis. The principal of the school along with the classroom teachers recommended the students for this study.

Participant 1 is an eighth grade Hispanic female who is currently receiving special education services in an inclusion setting and has an individualized education plan. Participant 1 is eligible for special services under the category "specific learning disability." She receives special services in an inclusive setting for science, math, and social studies. Participant 1 advocates for herself if she does not understand something in class. She also works diligently on independent practice assignments and rarely turns in assignments late. She struggles with oral expression and mathematical problem solving.

Participant 2 is an eighth grade, middle-eastern male who has an individualized education plan and is currently receiving special education in an inclusive setting. Participant 2 receives special services under the category of "other health impaired." He also has a diagnosis of ADHD. Participant 2 has also been diagnosed with auditory processing disorder which may interfere with his ability to follow directions and complete tasks with accuracy. His disability impacts his ability in the general education curriculum. His distractibility and inattentiveness may interfere with his ability to perform up to his potential. He works well in groups and strives to do well. Participant 2 also does well with visual learning and hands-on activities.

Participant 3 is an eighth grade, Asian male who has an individualized education plan and is currently receiving special education in an inclusive setting. Participant 3 receives special services under the category "other health impaired" due to a diagnosis of anxiety disorder and ADHD inattentive type. He presents with related difficulties in

processing information, attention maintenance, anticipatory stress, and a desire not to be viewed as different from others. Participant 3 also struggles with reading comprehension. He completes classwork, homework, and other assignments in a timely manner. He works well in cooperative learning groups.

Participant 4 is an eighth grade, Caucasian male who has an individualized education plan and is currently receiving special education in an inclusive setting. He receives special services under the category "other health impaired" due to a diagnosis of major depressive disorder and ADHD. He participates actively in class and works well with his peers in a lab setting. He responds well when he is given responsibility in a cooperative learning activity. Participant 4 struggles with comprehension and often needs rephrasing or repeating to extract meaning from text. He struggles to complete tasks on time due to his inattentiveness and often needs redirecting.

Participant 5 is an eighth grade, Caucasian female who has an individualized education plan and is currently receiving special education in an inclusive setting. She receives special services under the category of "specific learning disability" in the areas of reading comprehension and mathematical problem solving. Participant 5 has difficulty with basic math skills as well as reading and oral comprehension. She takes accurate notes and is able to recall information learned during whole group instruction.

Participant 6 is an eighth grade, Caucasian female who has an individualized education plan and is currently receiving special education in an inclusive setting. She receives special services under the category "specific learning disability." She is a respectful, conscientious students who participates frequently and is motivated to do well. Her specific learning disability in reading comprehension impacts her ability to keep up

with the pace and demands of the grade level curriculum. Participant 6 also struggles to solve multi-step problems in mathematics and making inferences in reading.

Table 1

Participant Data

Student	Age	Grade	Classification
Participant 1	14	8	Specific Learning Disability
Participant 2	13	8	Other Health Impaired
Participant 3	13	8	Other Health Impaired
Participant 4	13	8	Emotionally Disturbed ADHD
Participant 5	13	8	Specific Learning Disability
Participant 6	13	8	Specific Learning Disability

Research Design

This study used a single subject ABAB multiple baseline across participants design. Initial baseline data was collected using vocabulary quizzes of content vocabulary words every Friday for five weeks. During intervention phase one, the addition of Kahoot being played using the words from the weekly vocabulary quiz was implemented on Thursday of each week. The intervention, phase B, lasted for three weeks. The use of Kahoot was then removed for the second phase A, and put into place again for the second phase B in the same manner.

Variables

The independent variable in this study was the use of the online game Kahoot. The intervention aimed to increase the students' science vocabulary acquisition and engagement. The dependent variables were the students' vocabulary acquisition, as measured by science vocabulary quizzes, and student engagement, as measured by the checklist.

Procedure

The intervention was implemented over a six week period beginning in March 2017 and ending in May 2017. Phase A baseline data was collected for five weeks prior to beginning the intervention. Students played the online game Kahoot twice a week during the intervention, phase B, to aid their vocabulary acquisition of content words that coincided with the current unit of instruction. To play the online game Kahoot, the students used a Chromebook and responded to the questions that were displayed to the class on the ActivBoard in the front of the room. Students were assessed on their vocabulary acquisition via weekly vocabulary quizzes. Students filled in the correct vocabulary term that coincided with each definition provided. Students were also asked about their satisfaction with playing the online game Kahoot. They were given a Likert survey at the conclusion of the second intervention phase (see Figure 1).

Kahoot and Vocabulary Survey

Directions: Read each sentence below and place an **X** in the column you feel most accurately indicates your feelings.

Statements	Strongly Agree 5	Agree 4	Undecided 3	Disagree 2	Strongly Disagree 1
1. I found Kahoot easy to use.					
2. The Kahoot game kept me on task.					
3. I would rather use technology to stay on task.					
4. The Kahoot game was a distraction.					
5. I would like to use the Kahoot game in other classes or settings to help me study.					
6. I enjoyed using the game in class.					
7. I am prepared for tests and quizzes after using Kahoot.					
8. I would like to share this technology with friends and other students.					

Figure 1. Likert survey used to measure student satisfaction playing Kahoot.

Measurement and Data Analysis

The scores of each vocabulary quiz were recorded on a spreadsheet. Scores were recorded after each assessment in the baseline and intervention phases. After the scores of the quizzes were entered into the spreadsheet, the mean baseline data was compared to the mean intervention data with tables and graphs. Each student's baseline data was compared to their own intervention data. A checklist was used to measure student engagement while playing Kahoot. The checklist data was input onto a spreadsheet and graphed to show each student's engagement while playing the online game Kahoot. The data collected from the Likert survey was placed into a graph to show the students' satisfaction with playing the online game Kahoot.

Chapter 4

Results

Vocabulary Acquisition

Research question one asked, does playing Kahoot on a weekly basis increase the vocabulary assessment scores of students with learning disabilities in a middle school inclusion physical science classroom? Students' vocabulary scores were based off of weekly vocabulary assessments. Individual student science vocabulary scores were used to measure student science vocabulary acquisition. The means and standard deviation of student's scores on the weekly vocabulary assessments were calculated and are shown in Table 2.

Table 2

Science Vocabulary Acquisition: Mean and SD of Weekly Vocabulary Assessments Across Phases

	Baseline 1		Intervention 1		Baseline 2		Intervention 2	
	Mean %	SD %	Mean %	SD %	Mean %	SD %	Mean %	SD %
Participant 1	73.2	25.9	92	7.2	53.3	11.5	92	0
Participant 2	68.6	30.9	68.3	18.9	50	20	97.3	2.5
Participant 3	74.4	16.9	81	11.5	50	17.3	91.7	9.1
Participant 4	60.4	20.3	75.3	25.0	43.3	30.6	80.3	11.2
Participant 5	56.6	34.1	46.7	15.3	46.7	32.1	92.3	9.3
Participant 6	52.8	26.8	78.7	2.3	66.7	15.2	82.7	3.8

Weekly Vocabulary Assessment Scores

Participant 1. During the first baseline, Participant 1's mean score was 73.2. Participant 1's mean score increased to 92 during the first intervention phase. During the second baseline, her mean score fell to 53.3 but rose again during the second intervention phase to 92. Her standard deviation was reduced during both intervention phases. It was reduced from 25.9 to7.2 during the first intervention phase. It was reduced again from 11.5 to 0 during the second intervention phase. Participant 1's weekly science vocabulary assessment data is shown in Figure 2.

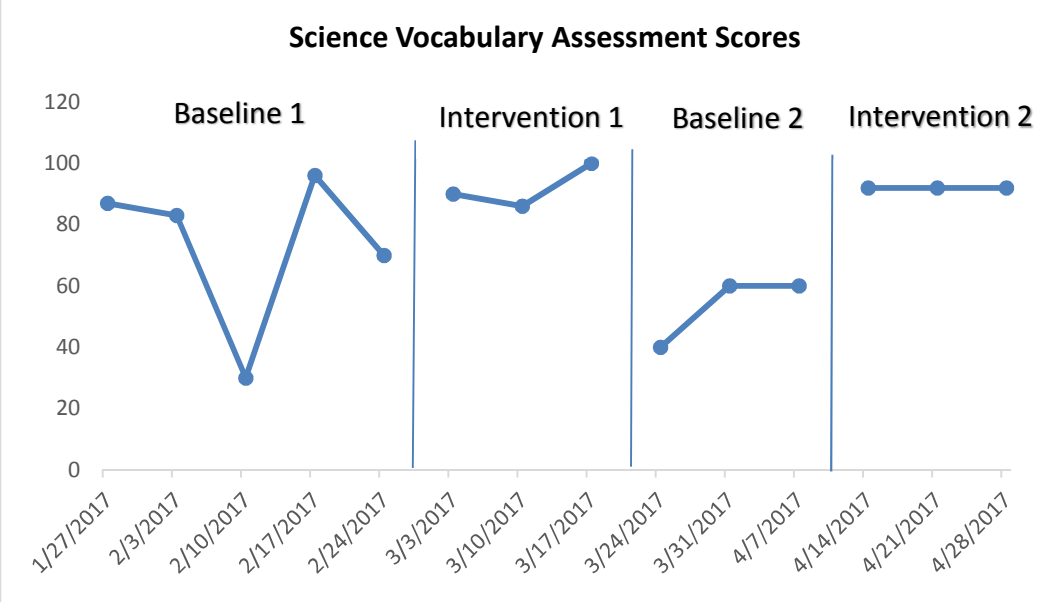

Figure 2. Weekly Science Vocabulary Assessment Scores Participant 1.

Participant 2. During the first baseline, Participant 2's mean score was 68.6. Participant 2's mean score decreased to 68.3 during the first intervention phase. During the second baseline, Participant 2's mean score was 50. His mean score increased to 97.3 during the second intervention phase. Participant 2's standard deviation decreased during

both intervention phases. His score decreased from 30.9 during the first baseline phase to 18.9 during the first intervention phase. His standard deviation decreased again from 20 during the second baseline phase to 2.5 during the second intervention phase. Participant 2's weekly science vocabulary assessment data is shown in Figure 3.

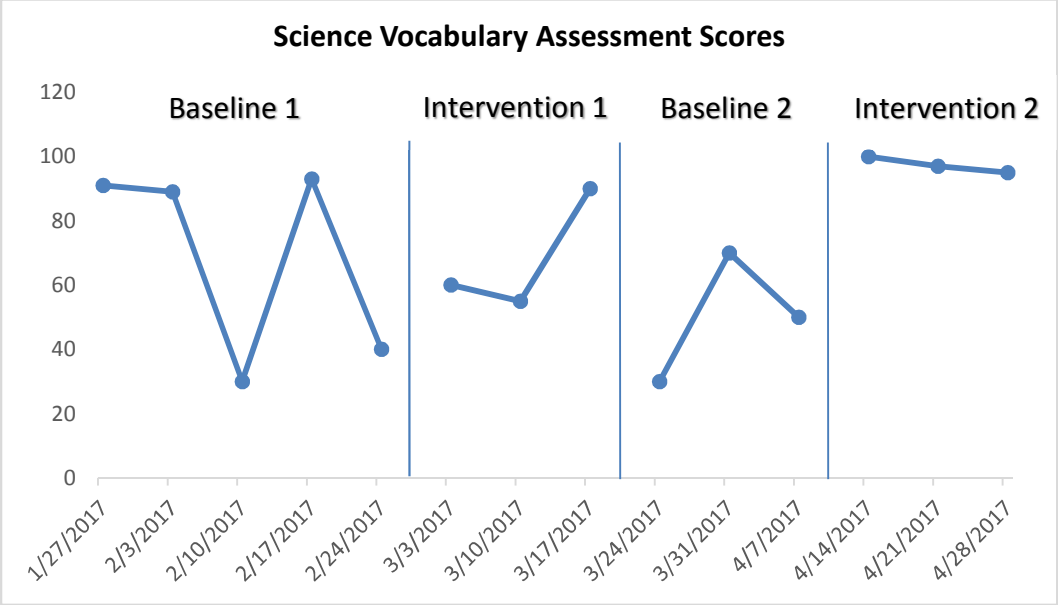

Figure 3. Weekly Science Vocabulary Assessment Scores Participant 2.

Participant 3. During the first baseline, Participant 3's mean score was 74.4. Participant 3's mean score increased to 81 during the first intervention phase. During the second baseline phase, Participant 3's mean score was 50. His mean score increased to 91.7 during the second intervention phase. Participant 3's standard deviation decreased during both intervention phases. It decreased from 16.9 during the first baseline phase to 11.5 during the first intervention phase. The standard deviation decreased from 17.3 during the second baseline phase to 9.1 during the second intervention phase. Participant 3's weekly science vocabulary assessment data is shown in Figure 4.

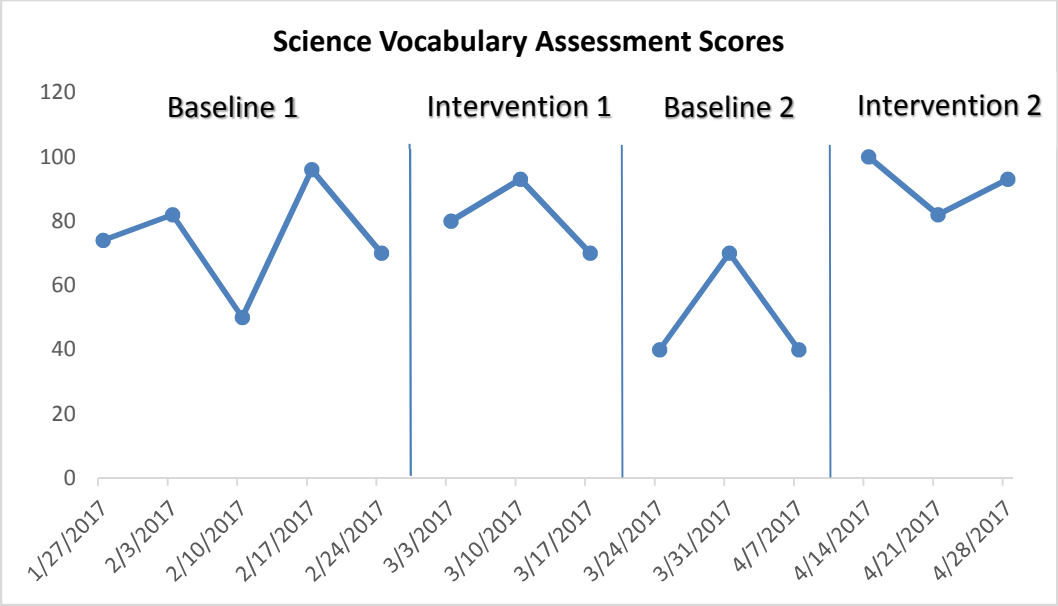

Figure 4. Weekly Science Vocabulary Assessment Scores Participant 3.

Participant 4. During the first baseline, Participant 4's mean score was 60.4. Participant 4's mean score increased to 75.3 during the first intervention phase. During the second baseline phase, Participant 4's mean score was 43.3. His mean score increase to 80.3 during the second intervention phase. Participant 4's standard deviation increased from 20.3 during the first baseline phase to 25 during the second intervention phase. His standard deviation increased again during the second baseline phase to 30.6. The standard deviation then decreased to 11.2 during the second intervention phase. Participant 4's weekly science vocabulary assessment data is shown in Figure 5.

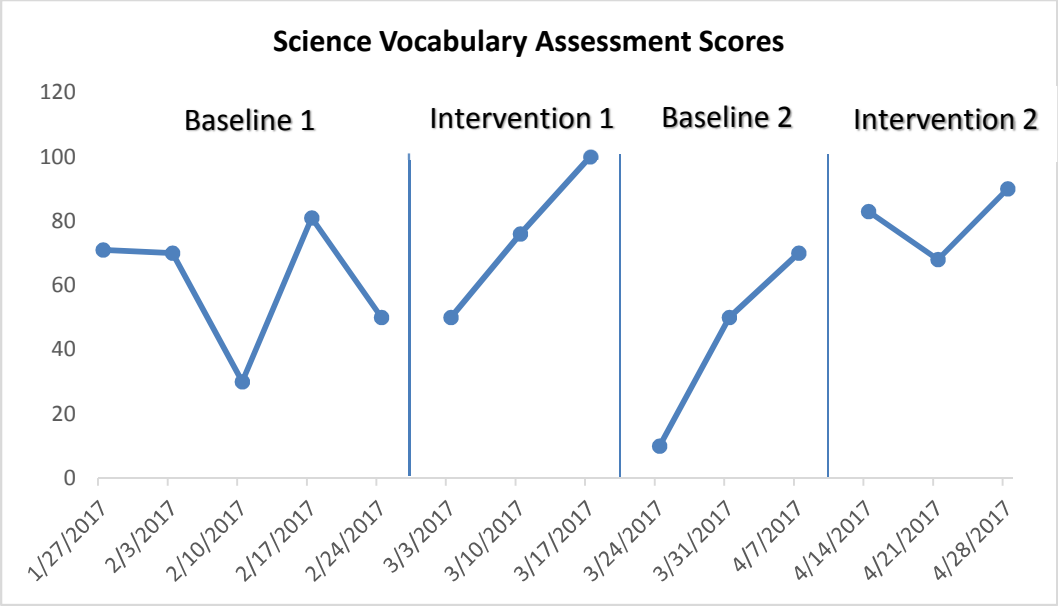

Figure 5. Weekly Science Vocabulary Assessment Scores Participant 4.

Participant 5. During the first baseline, Participant 5's mean score was 56.6. Participant 5's mean score decreased to 46.7 during the first intervention phase. During the second baseline phase, Participant 5's mean score was 46.7. Her mean score increased to 92.3 during the second intervention phase. Participant 5's standard deviation decreased during both intervention phases. The standard deviation decreased from 34.1 during the first baseline phase to 15.3 during the first intervention phase. The standard deviation decreased from 32.1 during the second baseline phase to 9.3 during the second intervention phase. Participant 5's weekly science vocabulary assessment data is shown in Figure 6.

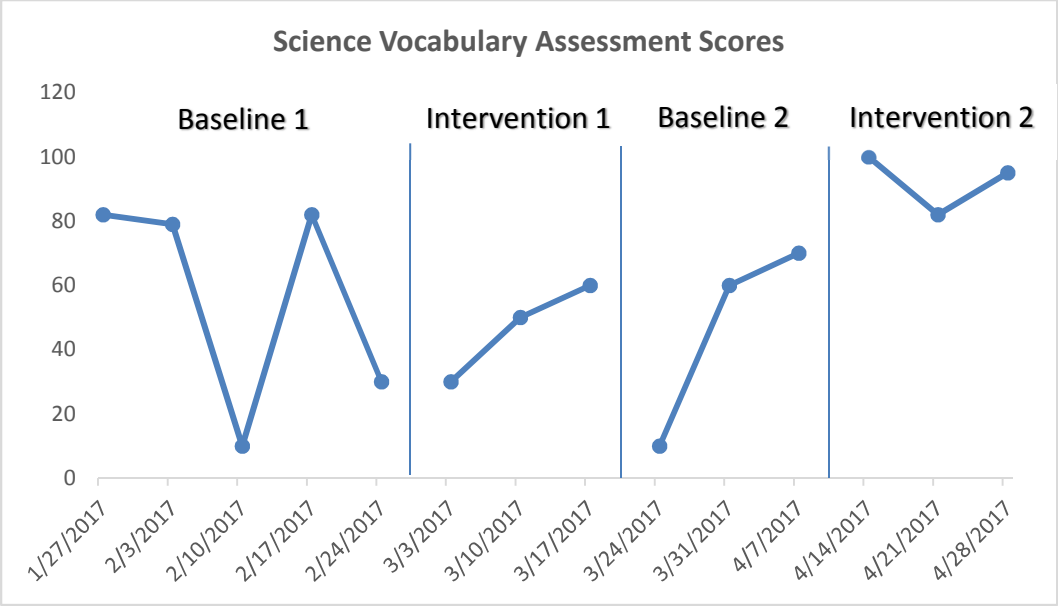

Figure 6. Weekly Science Vocabulary Assessment Scores Participant 5.

Participant 6. During the first baseline, Participant 6's mean score was 52.8. Participant 6's mean score increased to 78.7 during the first intervention phase. During the second baseline phase, Participant 6's mean score was 66.7. Her mean score increased to 82.7 during the second intervention phase. Participant 6's standard deviation decreased during both intervention phases. The standard deviation decreased from 26.8 during the first baseline phase to 2.3 during the first intervention phase. The standard deviation decreased from 15.2 during the second baseline phase to 3.8 during the second intervention phase. Participant 6's weekly science vocabulary assessment data is shown in Figure 7.

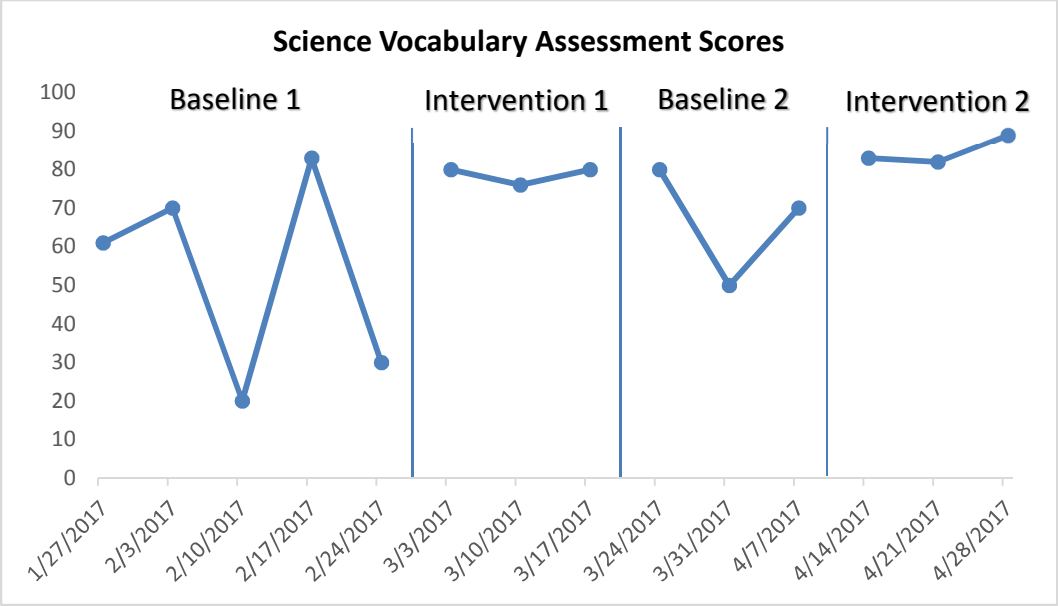

Figure 7. Weekly Science Vocabulary Assessment Scores Participant 6.

Student Engagement

Research question two asked, does playing Kahoot increase the focus and attention of students with learning disabilities in a middle school inclusion physical science classroom? Students were observed at regular five minute intervals during the class. During baseline phases, the number of students on task was recorded at five minute intervals for twenty minutes during vocabulary review. During intervention phases, the number of students on task was recorded for ten minutes before playing Kahoot and for ten minutes while playing Kahoot. Table 3 shows the mean number of students who were on task at each five minute interval.

Table 3

Mean and Standard Deviation of Students on Task Before and During Kahoot

Baseline 1		Intervention 1		Baseline 2		Intervention 2	
Mean %	SD %	Mean %	SD %	Mean %	SD %	Mean %	SD %
2	1.08	3	0.86	3	0.98	3	0.83

Note. Number out of six possible students; Mean of four intervals

During the first baseline phase, the mean number of students on task was two. During the first intervention phase, the mean number of students on task increased to three. The mean score then stayed at 3 through the second baseline phase and the second intervention phase. This data shows that there was limited variance between baseline and intervention phases. The Standard deviation during the first baseline phase was 1.08 and decreased to 0.86 during the first intervention phase. The standard deviation increased to 0.98 during the second baseline phase. The standard deviation then decreased to 0.83 during the second intervention phase.

Individual student data for Participant 1 showed Kahoot did increase on task behavior and focus from the baseline phases to the intervention phases. Participant 1's mean on task score was two during the first baseline phase. His mean score then increased to 4 during the first intervention phase. During the second baseline phase, Participant 1's mean on task score decreased to three. The mean on task score increased to four during the second intervention phase. Participant 2's mean on task score increased from two during the first baseline phase to four during the first intervention phase. His mean score decreased to three during the second baseline phase. During the second

intervention phase, his mean score increased to 4. Participant 3's mean on task score stayed constant at three from the first baseline phase to the first intervention phase. His score decreased to two during the second baseline phase and increased to three during the second intervention phase. Participant 4's mean on task score was one during the first baseline phase. His mean on task score increased to two during the first intervention phase and then decreased to one during the second baseline phase. During the second intervention phase, Participant 4's mean on task score increased to two. Participants 5 and 6 both had a mean on task score of two during the first baseline phase. Their mean scores then increased to three during the first intervention phase and stayed constant through the second baseline phase and the second intervention phase. All of the standard deviations across phases were below one except for the first baseline phase for Participants 1 and 2. These low standard deviation scores indicate that all of their on task behavior scores fell close to the mean. Table 4 shows individual mean and standard deviation scores for on task behavior.

Table 4

Mean on Task Tally Data

	Baseline 1		Intervention 1		Baseline 2		Intervention 2	
	Mean %	SD %	Mean %	SD %	Mean %	SD %	Mean %	SD %
Participant 1	2	1.14	4	0.58	3	1	4	0.58
Participant 2	3	0.89	4	0.58	4	0.58	4	0
Participant 3	3	1.14	3	0.58	2	1	3	1.15
Participant 4	1	0.84	2	1	1	0.58	2	0.58
Participant 5	2	0.55	3	1	3	0	3	1.15
Participant 6	2	0.89	3	0.58	3	0.58	3	0

Note. 4 tallies per class (taken at 5, 10, 15, and 20 minute intervals); possible total = 4

Survey Results

Research question three asked, are students satisfied with playing Kahoot? The Likert survey was given at the conclusion of the second intervention phase. Results were tallied and calculated into percentages. Table 5 represents the percent of students that responded in each category to each statement at the end of the second intervention phase.

Table 5

Student Satisfaction Survey

Statements	Strongly Agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly Disagree (%)
1. I found Kahoot easy to use.	92	8	0	0	0
2. The Kahoot game kept me on task.	50	25	25	0	0
3. I would rather use technology to stay on task.	42	25	8	25	0
4. The Kahoot game was a distraction.	8	0	0	17	75
5. I would like to use the Kahoot game in other classes or settings to help me study.	75	17	0	0	8
6. I enjoyed using the game in class.	83	17	0	0	0
7. I am prepared for tests and quizzes after using Kahoot.	50	25	17	0	8
8. I would like to share this technology with friends and other students.	50	33	8	0	8

In terms of student satisfaction with Kahoot, 100% of students indicated they found Kahoot easy to use, and 75% of the students indicated that Kahoot kept them on task. In addition, 92% of the students indicated that they did not think that Kahoot was a distraction to them in class and 67% of students indicated that they prefer to use technology to help them stay on task. In terms of Kahoot use in class, 100% of students

indicated that they enjoyed using Kahoot in science class, 92% of students indicated that they would like to use Kahoot in other classes, and 75% of students indicated that they felt Kahoot helped to better prepare them for tests and quizzes. In terms of sharing the technology with others, 83% of students indicated that they would like to share Kahoot with other students.

Chapter 5

Discussion

Findings

The purpose of this study was to investigate the effectiveness of the online game Kahoot on the science vocabulary acquisition and focus of students with learning disabilities in a middle school inclusion physical science classroom. In terms of science vocabulary, the results of this study show that four of six participants increased their mean vocabulary scores during both intervention phases, and four of six participants increased from the first baseline phase to the first intervention phase. All six of the participants increased their mean vocabulary scores from the second baseline phase to the second intervention phase. Participant 1 showed the greatest increase in mean vocabulary scores from baseline phases to intervention phases. Participant 5 had the smallest increase in mean vocabulary scores from baseline phases to intervention phases due to her score decreasing from the first baseline phase to the first intervention phase. These findings corroborate the findings of Abrams and Walsh (2014), in which students' language acquisition increased with the use of online video games.

The weekly vocabulary assessment score data reveals trends that occur across all participants. The third assessment during the first baseline phase showed lower assessment scores across all participants. This indicates that the vocabulary used on the assessment may have been more difficult than the vocabulary used on the other assessments. Four out of the five participants show similar decreased scores on the second assessment during the second intervention phase. Participants 3, 4, 5, and 6 all show lower scores on the second assessment during intervention two when compared to

the other assessments given over the same intervention phase. Again, this indicates that the difficulty of those vocabulary terms may have been more difficult than on other assessments given. The drop in assessment scores on these two assessments may also have been caused by starting a new unit of study in the physical science class. New units of study bring new concepts and vocabulary terms that may not have been familiar to the students.

In terms of student focus and on task behavior, the results of this study show that two out of six participants increased their on task behavior from baseline to intervention across all phases. Participants 1 and 4 both increased on task behavior from the first baseline phase to the first intervention phase and again from the second baseline phase to the second intervention phase. Participants 2, 5, and 6 had their on task behavior increase from the first baseline phase to the first intervention phase. Their mean on task behavior then stayed constant across the second baseline phase and second intervention phase. Participant 3's mean on task behavior score stayed constant from the first baseline phase to the first intervention phase. His mean score then decreased during the second baseline phase and increased back to initial mean during the second intervention phase.

Prior studies have warranted stronger results from using technology to increase student on task behavior (Yip & Kwan, 2006; Abrams & Walsh, 2004; Huang, 2015). One reason for this study obtaining less substantial results in terms of technology use and on task behavior could stem from the district's heavy reliance on technology across subjects and grades. Students in this district are exposed to technology at a very early age and move through the school system using the same technologies as they progress through the school system. This early and prolonged exposure to technology may lessen

the effects it has with on task behavior when compared to other students from districts that do not rely on technology as much.

In terms of social validity, the participants involved in this study were surveyed at the end of the second intervention phase to assess their satisfaction with playing Kahoot. All of the participants agreed that they found Kahoot easy to use. All of the participants indicated that they enjoyed using Kahoot in class, and 75% of the students indicated that they felt better prepared for tests and quizzes after playing Kahoot. In terms of Kahoot keeping participants on task, 75% of the students indicated that they felt Kahoot kept them on task and 67% of the participants indicated that they prefer to use technology to stay on task over traditional methods of instruction. Similarly, 75% of the students indicated that they strongly disagreed that Kahoot was a distraction in class. These results reflect the results of the mean on task behavior scores that are shown in Table 4. In terms of sharing Kahoot with their peers, 83% of the participants indicated that they would like to share Kahoot with their friends and other students.

Limitations

The results of this study may have been different if Kahoot had been first introduced to the students when the study began. The participants frequently used Kahoot in physical science since September to reinforce concepts and introduce ideas as well as vocabulary. When the study began at the end of January, all of the participants were already familiar with the online game and how it is used in physical science class. The school district also relies heavily on technology use in the classroom and so all of the participants were using Kahoot in other classes at the same time this study was being conducted.

Another limitation of this study was the time frame in which it was conducted. This study was a master's thesis conducted during the spring semester. The time between university IRB approval and the end of the semester was limited and as a result, each phase of the study after the initial baseline phase was limited to three weeks. Results may have differed if each phase was an equal length to collect an equal number of data points across all phases.

Finally, a limitation inherent to single subject design is small sample size. This study was conducted with six participants. Due to the small number of participants in this study, the results cannot be generalized to the entire population of special education students, and additional research with a larger sample size is warranted.

Implications

Despite the limitations of this study, the data suggests that using Kahoot with students who have a learning disability in a middle school physical science classroom increases vocabulary acquisition. This data reinforces previous studies (Yip & Kwan, 2006; Abrams & Walsh, 2014) that suggest using online games for vocabulary instruction increases student vocabulary assessment scores. These results have positive implications for using technology in the classroom for instructional purposes. As technology continues to advance and its use in the classroom continues to grow, this study as well as other studies completed (Yip & Kwan, 2006; Abrams & Walsh, 2014; Huang, 2015; Wang, 2015) indicate that using online games for instructional purposes has positive implications for students' academic success.

The data also suggests that most students enjoy playing Kahoot, find it easy to use, and feel as though they are better prepared for class assessments after playing

Kahoot. This data corroborates the findings of Wang (2015). In that study 75% of the students surveyed after the intervention indicated that they felt they learned something from playing Kahoot and 57% said that they would like to continue to play Kahoot (Wang, 2015).

Conclusion

This study was encouraging as it shows the positive effect that playing Kahoot has on science language acquisition in students with learning disabilities. It also showed that Playing Kahoot in class does have some positive effects on keeping students focused and increasing on task behavior. The results of the student satisfaction survey were positive and showed that the students enjoyed playing Kahoot as well as found it beneficial to their assessment preparedness. While this study demonstrates the positive effects that Kahoot has on science vocabulary acquisition in students with learning disabilities, further studies are recommended to be conducted with a larger number of participants, and over a greater time period to further the research on Kahoot and vocabulary acquisition.

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