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The effects of Kahoot! on vocabulary acquisition and retention of students with learning disabilities and other health impairments

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**THE EFFECTS OF KAHOOT! ON VOCABULARY ACQUISITION AND
RETENTION OF STUDENTS WITH LEARNING DISABILITIES AND OTHER
HEALTH IMPAIRMENTS**

by
Kathryn E. Ciaramella

A Thesis

Submitted to the
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at
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Thesis Chair: Amy Accardo, ED D.

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Dedications

I would like to dedicate this thesis to my parents, Tony and Kathy. Your constant love, support, and encouragement throughout this journey were greatly appreciated.

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I would like to express my gratitude to Professor Amy Accardo, Ed. D. for her continuous support throughout my research study.

Abstract

Kathryn E. Ciaramella
THE EFFECTS OF KAHOOT! ON VOCABULARY ACQUISITION AND
RETENTION OF STUDENTS WITH LEARNING DISABILITIES AND OTHER
HEALTH IMPAIRMENTS
2016-2017
Amy Accardo, Ed.D.
Master of Arts in Special Education

The purpose of this study was to evaluate the effect of Kahoot! on vocabulary acquisition, evaluate the effect of Kahoot! on vocabulary retention, and determine student satisfaction with using Kahoot as an intervention. The seven sixth grade students participating in the study were classified with a learning disability or other health impairment and received instruction in a pull-out replacement language arts classroom. A single subject multiple baseline across participants design was utilized. During the baseline phase, data was collected to determine the percentage of vocabulary words each student acquired and retained. During the intervention phase, data was again collected and compared to the baseline data. Results indicate that using a game-based learning platform may lead to an increase in vocabulary acquisition and retention. Further research is needed to determine the effect of Kahoot! on long-term vocabulary retention and reading comprehension.

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Chapter 1

Introduction

Vocabulary acquisition is essential for students, as it increases reading comprehension (McKeown, Beck, Omanson, & Perfetti, 1983; Horn & Feng, 2012; Harris, Shumaker, & Deshler, 2011). Although students may be able to fluently decode the text they are reading, if they are unable to comprehend the meaning of the words being read, their comprehension may be inaccurate. According to the National reading Panel ([NRP], 2000), reading comprehension requires students to interact with the text they are reading by constructing meaning from the text and using this new learning. Students who have stronger vocabulary skills may also possess the ability to better infer the meaning of unknown words through context clues (Rupley, Logan, & Nicholas, 2002), which further promotes comprehension.

Vocabulary instruction promotes reading comprehension and the ability to make inferences, particularly for those students who are struggling (Heilman, Blair, & Rupley, 2002). Typically developing students can acquire new vocabulary through independent reading activities; however, struggling readers and readers with disabilities may be unable to acquire vocabulary or infer unknown words' meanings through independent reading (Palmer, Boon, & Spencer, 2014). Students with learning disabilities and other health impairments often struggle in the area of reading comprehension (Stetter & Hughes, 2011; Palmer et al., 2014), which may make it difficult for these students to fully understand what they have read. A learning disability (LD) is defined as “a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written” and the “disorder may manifest itself in the imperfect ability

to listen, think, speak, read, write, spell, or do mathematical calculations” (Individuals with Disabilities Education Act [IDEA], 2004, Specific Learning Disability, para. 1). Other health impairment (OHI) is defined as “having limited strength, vitality, or alertness, including a heightened alertness to environmental stimuli, that results in limited alertness with respect to the educational environment that adversely affects a child’s educational performance” (IDEA, 2004, Other Health Impairments, para. 1).

The connection between vocabulary knowledge and comprehension has been extensively studied and results have shown an increase in vocabulary correlates with an increase in reading comprehension (Quinn, Wagner, Petscher, & Lopez, 2015). Studies have also shown that students with LD and OHI frequently exhibit deficits in the area of reading comprehension (Stetter et al., 2011; Palmer et al., 2014). It appears effective vocabulary instruction and retention is essential to increasing student reading comprehension outcomes.

Statement of the Problem

Students who have limited vocabularies and are in need of intensive vocabulary instruction, such as students with LD and OHI, have difficulty inferring the meaning of unknown words (Sharma & Unger, 2016). This inability to infer the meaning of unfamiliar words may lead to an inability to accurately understand a text, despite being able to fluently decode it. Improved writing ability, speaking and listening skills, and reading comprehension have all been linked to vocabulary knowledge (Sharma & Unger, 2016). This research emphasizes the importance of teaching students with LD and OHI grade-level vocabulary.

The English Language Arts Common Core State Standards Initiative (2017) expects students in sixth grade to “acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression” (Vocabulary Acquisition and Use, para. 10). This initiative requires all students at the sixth grade level, including those with LD and OHI, to acquire and retain grade-level vocabulary.

Traditional vocabulary instruction consists of looking up definitions in the dictionary and writing sentences using those words, a process which can be challenging and frustrating for students with special needs (Palmer et al., 2014). Vocabulary instruction for students with LD and OHI should consider their strengths and weaknesses as learners in order to increase reading comprehension, speaking and listening, and writing skills (Lewis & Feng, 2014; Sharma & Unger, 2016). In addition, there is a need for classroom instruction that promotes retention of newly acquired vocabulary words for students with LD and OHI (Horn & Feng, 2012).

Implementing vocabulary instruction through the use of technology has the ability to increase student test scores (Sharma & Unger, 2016). Utilizing technology to teach vocabulary creates an engaging means of instruction that also allows for a transition from monotonous and outdated dictionary practices to meaningful exercises (Sharma & Unger, 2016). Kahoot!, a game-based learning platform that serves as a student response system (Dellos, 2015), provides an engaging method for students to practice their newly learned vocabulary. Kahoot! allows teachers to create technology-based quizzes that award points to the students for their correct answers, and allows students to submit their answers anonymously through a computer, tablet, or smart phone (“The Kahoot! Guide,”

2016). The ability to utilize Kahoot! as a student response system may encourage students who have anxiety or are introverted to participate more freely; thus, making the lesson more effective for them (Stowell & Nelson, 2007). In addition, Kahoot! provides immediate feedback to the teacher and student (Stowell & Nelson, 2007), which serves as a formative assessment. It appears students have the ability to self-assess their progress throughout the use of Kahoot!. In addition, teachers can gauge their students' progress on vocabulary acquisition while creating a fun and engaging means for promoting learning and retention.

Significance of the Study

Further research is needed to evaluate new methods to increase vocabulary acquisition and retention for sixth grade students with learning disabilities and other health impairments. Multiple studies have investigated the correlation between vocabulary acquisition and comprehension (McKeown et al., 1983; Palmer et al., 2014; Horn & Feng, 2012; Quinn et al., 2015); however, further research is needed to determine an effective method for promoting vocabulary acquisition and retention for these students. This study is unique in that it will focus on the effects of implementing a game-based learning platform to promote vocabulary acquisition and retention for sixth grade students with learning disabilities and other health impairments.

Purpose of Study

The purpose of this study is to evaluate the effectiveness of using Kahoot! on the vocabulary acquisition and retention of sixth grade students with learning disabilities and other health impairments. Specifically, this study will (1) analyze how using Kahoot! to

learn vocabulary effects the students' test scores, (2) assess Kahoot!'s ability to promote vocabulary retention, and (3) evaluate student attitudes towards using Kahoot!.

Research Questions

1. Will the use of Kahoot! impact the vocabulary acquisition of students with learning disabilities and other health impairments in a sixth grade resource language arts classroom?
2. Will the use of Kahoot! impact the vocabulary retention of students with learning disabilities and other health impairments in a sixth grade resource language arts classroom?
3. Are the students with learning disabilities and other health impairments satisfied with the use of Kahoot! in the resource language arts classroom?

Key Words

For the purpose of this study, *vocabulary acquisition* will be defined as the ability to learn the meanings of unknown words and to apply these definitions when encountering the words in a text while reading.

For the purpose of this study, *vocabulary retention* will be defined as the ability to recall the meanings of previously taught vocabulary words and the ability to apply these definitions when encountering the words in a text while reading two weeks or more after first learning the words' meanings.

Chapter 2

Review of the Literature

Emphasis on vocabulary instruction has declined and has not been a paramount priority of research or professional discussions (Rupley et al., 2002). Despite a plethora of research that suggests vocabulary acquisition bolsters reading comprehension (McKeown et al., 1983; Palmer et al., 2014; Horn & Feng, 2012; Quinn et al., 2015), there has been little research conducted to determine an effective method for teaching vocabulary acquisition and retention to students.

Vocabulary Acquisition and Comprehension

Vocabulary instruction is beneficial for all students, including those with learning disabilities and other health impairments (Horn & Feng, 2012). Acquiring grade-level vocabulary is essential for students beyond their language arts curriculum, as it helps them understand the texts they are reading in other content area classes (Palmer et al., 2014). Science and history textbooks often contain content-specific vocabulary that is above grade-level, which make passages incomprehensible to some students with special needs (Palmer et al., 2014). The correlation between vocabulary knowledge and reading comprehension suggests that the more words a student can accurately recall the meaning of, the more likely he or she is to understand a given passage (Quinn et al., 2015).

Students who have limited vocabulary skills have difficulty inferring the meanings of unknown words (Sharma & Unger, 2016; Rupley et al., 2002). Students with special needs frequently possess limited vocabulary skills and are unable to acquire vocabulary through independent reading activities (Palmer et al., 2014). This research suggests that students with special needs may require a greater emphasis on vocabulary

instruction to help them become more successful readers, which may help them to better comprehend texts in their academic classes. Therefore, a focus on vocabulary instruction may enhance the reading comprehension skills of students with special needs in academic classes.

There is a consensus in the research that an increase in vocabulary knowledge leads to an increase in reading comprehension (McKeown et al., 1983; Palmer et al., 2014; Horn & Feng, 2012; Quinn et al., 2015). McKeown, Beck, Omanson, and Perfetti (1983) studied the effect of vocabulary acquisition on the reading comprehension of fourth graders from two schools in an urban area. In each school, the researchers designated one fourth grade classroom to be the experimental group and three other classrooms to be the control group. The fourth graders were taught one-hundred and four vocabulary terms and then assessed on their vocabulary knowledge, reading fluency, and comprehension knowledge. The results suggest that intensive vocabulary instruction may increase students' word knowledge, fluency, and comprehension of stories that contained the vocabulary words (McKeown et al., 1983).

Palmer and colleagues (2014) studied the effect of concept mapping instruction on vocabulary acquisition for students with mild disabilities. The study's participants included four seventh grade students who received daily instruction in a resource language arts classroom. Two of the students were classified with an emotional/behavioral disorder and the other two students were classified with other health impairments. The researchers compared the use of a traditional dictionary approach to acquiring vocabulary terms to the use of concept mapping using a reversal design. The researchers found that all four students' vocabulary knowledge increased

when using concept mapping. Using concept mapping to help students acquire vocabulary may lead to an increase in comprehension (Palmer et al., 2014).

Moreover, Horn and Feng (2012) studied the effect of vocabulary instruction on reading comprehension in two seventh grade language arts classes each consisting of twenty-nine students. The researchers provided direct vocabulary instruction to one class and used the other class as the control group. The researchers found that the test scores of the experimental group did not significantly increase as a result of the vocabulary intervention; however, the experimental group increased their comprehension scores from the pre-test to the post-test by nearly twice that of the control group. The results suggest that an increase in vocabulary acquisition may lead to an increase in reading comprehension (Horn & Feng 2012).

Similarly, Quinn and colleagues (2015) studied the effect of vocabulary knowledge on reading comprehension of 316 first graders. The study followed the students through fourth grade and continued to assess their progress. When the study concluded, 219 students remained in the study. The researchers assessed the students using the Stanford-Binet Intelligence Scales V: Vocabulary Subtest, the Wechsler Abbreviated Scales of Intelligence: Vocabulary Subtest, Woodcock Reading Mastery Test: Passage Comprehension, and WJ-III Tests of Achievement: Passage Comprehension. The researchers found that reading comprehension may be supported by vocabulary knowledge (Quinn et al., 2015).

In contrast to the findings of McKeown et al. (1983), Palmer et al. (2014), Horn and Feng (2012), and Quinn et al. (2015), the National Reading Panel (2002) reports it is difficult to determine that vocabulary acquisition is directly correlated to reading ability.

Reading comprehension looks at the overall meaning of a larger text while vocabulary focuses on individual words, which may make it difficult to accurately analyze the two skills in isolation when trying to prove a correlation (NRP, 2002).

Vocabulary and Students with Learning Disabilities and Other Health Impairment

Children acquire the vast majority of their vocabulary through social interactions (Quinn et al., 2015; Lewis & Feng, 2014); however, due to the nature of certain disabilities, children with special needs may be less likely to interact with others (IDEA, 2004). This decrease in social interactions with others may lead to a decrease in vocabulary acquisition. The discrepancy in vocabulary knowledge between students who are high achieving and low achieving is estimated to be a difference of 4,500 words to 5,400 words (Sharma & Unger, 2016). This large discrepancy in vocabulary knowledge can lead to major challenges in school, specifically in reading comprehension (Rupley et al., 2002; Palmer et al., 2014; Horn & Feng, 2012; Quinn, 2015; Sharma & Unger, 2016). In contrast, students who have extensive vocabulary knowledge are able to effectively infer the meaning of unfamiliar words they encounter in a text (Rupley et al., 2002). In contrast, the students who require intensive vocabulary instruction are the least likely to have the ability to infer the meanings of unfamiliar words (Sharma & Unger, 2016).

There has been a great emphasis on improving reading abilities for young children in the United States; however, secondary students often do not receive the same intensive reading instruction (Harris et al., 2011; Faggella-Luby & Deshler, 2008). Of these secondary students, 68% score below the proficient level in reading and many of these students are students with learning disabilities (Harris et al., 2011). The role of high school is to prepare these adolescent students for the job market, which is becoming

increasingly competitive. Students who will be most likely to succeed in the demands of the modern workplace will need to be able to think critically and fully understand how the information that has been presented to them links together (Faggella-Luby & Deshler, 2008). These demands will be difficult for students with learning disabilities, as they demonstrate deficits in reading comprehension (Faggella-Luby & Deshler, 2008). Students with learning disabilities may perform lower in the area of reading comprehension due to their significant vocabulary deficits (Harris et al., 2011).

Although the majority of the special education students receiving support for reading deficits are classified with a learning disability, there is a growing number of students with other classifications, such as other health impairments, who also demonstrate these same reading deficits (Lewis & Feng, 2014). Students with other health impairments vary in their physical and intellectual abilities, which may make it difficult to accurately assess their present levels of functional performance (Kendall, 1991). Teachers must be familiar with the individual needs of each student classified as other health impaired in order to effectively work with them (Kendall, 1991). In order for students with other health impairments to become successful readers, they must become fluent decoders (Lewis & Feng, 2014). In addition, an emphasis on vocabulary instruction is essential to help these students further comprehend the text they are reading (Harris et al., 2011).

Vocabulary Instruction

Instruction asking students to look up definitions in dictionaries and copy down definitions has been found to be ineffective (Palmer et al., 2016), and students with limited vocabulary knowledge may benefit from instruction that includes direct

instruction to acquire new vocabulary (Palmer et al., 2014; Horn & Feng, 2012; Rupley et al., 2002), the use of concept maps (Palmer et al., 2014), and the use of technology (NRP, 2002). In order for students to be successful, it is recommended teachers provide direct vocabulary instruction and provide opportunities for the students to practice their newly acquired vocabulary words (Rupley et al., 2002; Stetter & Hughes, 2011; NRP, 2002).

Palmer, Boon, and Spencer (2014) studied the effect of concept mapping on vocabulary acquisition of seventh graders in a resource language arts classroom using an ABAB reversal design. During the baseline phase, the students were given a set of words, looked up the words' definitions in the dictionary, and wrote a sentence using the words. During the intervention phase, the students were taught to utilize the Frayer model: a concept map created using the vocabulary word, the word's definition, a sentence using the word, and an illustration that connected to the word. The students were administered a post-assessment upon the completion of each vocabulary unit. Palmer et al. (2014) found that concept mapping was more effective in increasing the vocabulary acquisition of students with disabilities in the resource language arts classroom than traditional instruction. When the reversal design was implemented and the baseline procedures were reinstated, the students' grades also returned to baseline levels. When the intervention was implemented for a second time, the students' grades again increased (Palmer et al., 2014).

Moreover, it is recommended that vocabulary instruction includes the opportunity for students to apply their learning while reading (Horn & Feng, 2012). Making connections to newly learned vocabulary words, e.g. through concept maps, may promote retention and understanding (Palmer et al., 2014; NRP, 2002). Students who have the

opportunity to make real-world connections to newly acquired vocabulary words and use them in conversations are more likely to retain the word meanings (Sharma & Unger, 2016). As a result, students should be instructed to do more than memorize the definition of unfamiliar terms (Rupley et al., 2002; Horn & Feng, 2012; Palmer et al., 2014; NRP, 2002; McKeown et al., 1983). Students who encounter vocabulary in context, are encouraged to demonstrate their understanding of vocabulary, and utilize it appropriately in their everyday conversations, are more successful in retaining the vocabulary as well as more able to infer the meanings of unknown words in the future (Rupley et al., 2002).

Horn and Feng (2012) studied the impact of vocabulary acquisition on reading comprehension of seventh grade language arts students. The control group was randomly assigned and received no direct vocabulary instruction. The experimental group was taught vocabulary using direct instruction using vocabulary terms that would appear in class readings. The results suggest there was not a strong correlation between vocabulary acquisition and reading comprehension; however, the experimental group's assessment scores did increase by a larger percentage than those in the control group (Horn & Feng, 2012).

Technology & Vocabulary Instruction

The National Reading Panel (2002) encourages teachers to incorporate the use of technology to teach vocabulary. Technology based vocabulary instruction allows students to access online definitions and teachers to support their direct instruction with computer tools (NRP, 2002). There are a plethora of online tools available, including educational games and online graphic organizers, which teachers can utilize to make their vocabulary instruction more engaging and effective (Sharma & Unger, 2016). The use

of technology can also provide real-time feedback to both the teachers and the students to monitor the students' progress throughout a lesson (Dellos, 2015). Technology has also been found effective at increasing students' vocabulary acquisition and retention skills (Huang, 2015; Johnson, Gersten, & Carnine, 1987). In addition, technology has the ability to provide user-centered learning opportunities to expand and extend what has been taught (Sharma & Unger, 2016).

Huang (2015) studied the effects of technology on the vocabulary acquisition of forty second grade students. Two classes were selected and one class was used as the control group while the other class was used as the experimental group. The experimental group received vocabulary instruction and reinforcement practices that implemented the use of technology. The experimental group also played vocabulary games on the computer to reinforce the newly taught content. The control group received traditional vocabulary instruction. Each class was administered a posttest to determine the efficacy of the intervention. The scores of the experimental group significantly increased while the scores of the control group were minimal. The results seem to indicate that incorporating technology to teach and reinforce vocabulary may increase students' vocabulary acquisition and retention skills (Huang, 2015).

Johnson and colleagues (1987) studied the effects of technology on vocabulary acquisition and retention of twenty-five high school students with LD. The students were broken into two subgroups and were each taught vocabulary using technology in the form of a computer. The first subgroup was presented with smaller sets of vocabulary words via computer and was given cumulative retention practice tests. The second subgroup was given larger sets of vocabulary words and was not given retention practice tests. The

students were administered a criterion-referenced test upon conclusion of instruction and the results showed that each subgroup learned an equivalent amount of vocabulary words; however, the first subgroup learned and retained the vocabulary terms more significantly. The results seem to indicate that vocabulary instruction using technology is effective at promoting acquisition and retention for students with LD if the vocabulary words are presented in manageable quantities (Johnson et al., 1987).

Although the findings of Huang (2015), Johnson, and his colleagues (1987) seem to indicate that the use of technology is effective in helping students acquire vocabulary and promoting retention, Kilickaya and Krajka (2010) found that teachers seem to be unaware of how to help their students acquire vocabulary through technology. The researchers surveyed and interviewed eighty English teachers and asked them about their vocabulary instruction procedures. Their findings showed that the majority of the participants rarely or never incorporated technology into their vocabulary instruction. These results seem to indicate that although there are a plethora of technologies available to teach vocabulary and that the results of other studies have suggested it is effective, teachers may be unfamiliar with how to make their vocabulary instruction more meaningful using technology (Kilickaya & Krajka, 2010).

Student Response Systems

Student response systems (SRS) have been identified as an effective method for increasing student participation through the use of technology (Fies & Marshall, 2006). A student response system is any technology, such as a smart phone, laptop, tablet, or clicker, which allow students to answer and participate in teacher-posed questions (Stowell & Nelson, 2007). An increase in student participation may lead to an increase in

student learning (Stowell & Nelson, 2007) and student response systems may be beneficial in teaching students with learning disabilities and other health impairments vocabulary. Underachieving students may be intimidated to participate in class in front of their peers, which may create an unbalanced benefit for the higher achieving students, as they are more willing to participate (Graham, Tripp, Seawright, & Joekel, 2007). Students with LD and OHI may be the lower achieving students within a classroom who are not volunteering to answer a question; thus, missing out on essential class instruction. Students must be engaged in order to fully maximize their learning potential (Graham et al., 2007).

Students may be more likely to participate using a student response system (Stowell & Nelson, 2007). The ability to respond anonymously may be appealing to students who are reluctant to participate through traditional hand-raising methods (Stowell & Nelson, 2007; Graham et al., 2007). Students can simply indicate their answer by clicking a button, which prevents other students from knowing if they were right or wrong. This allows all participants to be actively engaged and to fully participate in classroom instruction.

Another benefit of student response systems is they allow teachers to see student responses in real time (Stowell & Nelson, 2007; Fies & Marshall, 2006; Graham et al., 2007). Tracking student progress through the use of a student response system serves as a convenient formative assessment for the teacher, allowing the teacher to see which information the students understand and which information needs further clarification. Teachers can also provide the students with real time feedback via the student response system, allowing the students to self-assess their own understanding of a concept (Fies &

Marshall, 2006). Research suggests that the implementation of student response systems leads to greater student participation and more learning (Fies & Marshall, 2006).

Stowell and Nelson (2007) studied the effects of student response systems on student participation, learning, and emotion. The researchers studied one hundred and forty undergraduate college students who were enrolled in a psychology class. The experimental group was given SRS to answer questions upon hearing a class lecture. The control group was asked the same questions, but had to respond by raising their hands. The results showed the clicker group had a higher percentage of participation, particularly on the questions that were more challenging. In addition, the researchers found through student surveys that the students enjoyed using the SRS during class and felt more comfortable responding through the technology. The results of this study seem to indicate that using SRS may increase student participation and help the students to maintain a positive outlook during class (Stowell & Nelson, 2007).

Bartsch and Murphy (2011) studied the effects of student response systems on student engagement and performance. The researchers studied fifty-two college students randomly assigned to either the control group or the experimental group. Both groups were presented the identical lesson and asked the same questions. The control group was required to raise their hands to respond to the questions while the experimental group was given SRS to respond to the questions. Upon completion of the lessons, the students were administered a survey to rate their experience during the class and then a pop quiz to assess their learning. The results showed the students who were in the experimental group scored higher on their quiz. These results seem to indicate that the use of SRS can

lead to an increase in student engagement and an increase in student learning (Bartsch & Murphy, 2011).

Kahoot!

Kahoot! is a student response system that encourages student to participate and keeps them engaged because of its game-based platform (Dellos, 2015). Some researchers have called Kahoot! a game-based student response system (GSRS), as it is a combination of a student response system and a game-based learning platform (Wang, 2014; Sharma & Unger, 2016). Kahoot! allows teachers to create online quizzes that can be accessed through student smart phones, tablets, or computers (Dellos, 2015; “The Kahoot! Guide,” 2016).

The student response system feature of Kahoot! allows students to anonymously answer questions through their device (Wang, 2014). The ability to answer questions anonymously may encourage reluctant participants within a class to participate (Stowell & Nelson, 2007; Graham et al., 2007). After each question is answered, the teacher is able to see how each student answered the question (Wang, 2014; “The Kahoot! Guide,” 2016; Dellos, 2015). This allows the teacher to assess how the students are performing in the class in real time, which may make the subsequent instruction more effective. Research has shown that both teachers and students have positive attitudes towards using student response systems (Caldwell, 2007).

Kahoot!’s game-based learning platform features include the ability to earn points, engaging sound effects, and motivational music (Wang & Lieberoth, 2016). Teachers can adjust the amount of points each question is worth and students can earn points for answering the questions correctly (Dellos, 2015; “The Kahoot! Guide,” 2016).

Students may enjoy the friendly competition with their classmates as they try to earn as many points as possible (Dellos, 2015). This feature of Kahoot! encourages participation and makes learning fun. Research also suggest that Kahoot!'s audio and music create a positive learning experience for the users that encourages participation (Wang & Lieberoth, 2016). The use of Kahoot! may be effective in increasing student academic vocabulary retention and acquisition, however, there is limited research evaluating the efficacy of utilizing a game-based learning platform on the vocabulary learning of students with learning disabilities and other health impairments.

Summary

Research has shown that an increase in vocabulary acquisition can lead to an increase in reading comprehension skills (McKeown et al., 1983; Palmer et al., 2014; Horn & Feng, 2012; Quinn et al., 2015). A greater emphasis needs to be placed on vocabulary instruction and retention to help struggling students become better readers. Technology has developed substantially in recent years and should be incorporated into instruction (Sharma & Unger, 2016). The implementation of technology into lessons may increase student participation, which may lead to greater learning outcomes for students (Sharma & Unger, 2016). The more time students spend engaged and actively participating in a lesson, the more the students will benefit from the instruction (Graham et al., 2007).

Game-based learning platforms and student response systems are an effective method of increasing student participation (Stowell & Nelson, 2007; Graham et al., 2007). Kahoot! combines the elements of a game-based learning platform and a student response system and creates an engaging formative tool for teachers and students (Dellos,

2015; Wang, 2014). At the present time, there is no research evaluating the efficacy of utilizing a game-based learning platform on the acquisition and retention of vocabulary for sixth grade resource students with learning disabilities and other health impairments. More research is needed in this area as identifying an effective method of teaching vocabulary to these populations may improve their reading comprehension.

Chapter 3

Methodology

Setting and Participants

This study included seven sixth grade special education students who are between the ages of eleven and twelve. The students attend an upper elementary school in a rural southern New Jersey district that contains grades four, five, and six. The district has three elementary schools, an upper elementary school, a middle school, and a high school. The district is known for its competitive sports teams and talents in the arts. The district is located in an affluent town that won the title of Best Place to Live in 2005. The students at the upper elementary school attend school for seven hours each day and are required to complete more than the 180 school days required by the state.

According to the New Jersey School Performance Report (New Jersey Department of Education, 2015), of the 878 students enrolled at the school, 70.7% are white, 10.4% are Asian, 7.1% are black, 5.8% are Hispanic, 5.8% are two or more races, and 0.2% are American Indian. At 18%, nearly one-fifth of the school's population is comprised of students with disabilities. In addition, despite the town's reputation for being affluent, there are students within the district who are economically disadvantaged. These students constitute 11.5% of the student body at the upper elementary school.

The seven students selected for this study were either classified with a learning disability or other health impairment per their individualized educational plan. All seven students receive pull-out replacement instruction in a resource classroom for mathematics and language arts and in-class support for science and history. In addition, the seven

students also receive additional academic and organizational support one period every other day. Table 1 presents general information about the seven participants.

Table 1

General Information about the Seven Participants

Student	Age	Grade	Classification	Mean (%) acquisition scores prior to intervention	Mean (%) retention scores prior to intervention
A	12	6	SLD	26.7	33.3
B	12	6	OHI	46.7	20.0
C	12	6	SLD	50.0	20.0
D	12	6	OHI	46.7	20.0
E	12	6	OHI	23.3	16.7
F	11	6	OHI	18.3	0
G	11	6	SLD	46.7	33.3

Participant A. Student A is a sixth grade Caucasian male who is currently receiving special education services according to his individualized education plan. Student A is eligible for services under the category of specific learning disability. He also has documented anxiety and attends social skills counseling once a week. Student A

is very quiet and shy; however, once he has established a good rapport with his teacher, he feels comfortable sharing his interests. Student A does not consistently raise his hand to participate in class discussions; however, when he is called upon he often knows the answer. Student A also has tics that manifest themselves as involuntary head turning and repetition on phrases that have been said aloud.

Participant B. Student B is a sixth grade Caucasian male who is currently receiving special education services according to his individualized education plan. Student B is eligible for services under the category of other health impairment. He also has documented attention deficit hyperactivity disorder (ADHD) and a processing disorder and receives speech and language therapy and occupational therapy once a week. Student B is a very hard-working student who strives to do his best at all times. Due to his ADHD and processing disorder, he has difficulty fully attending to class instruction. Student B does not always advocate for himself when he is unclear of directions or how to apply new learning to an assignment.

Participant C. Student C is a sixth grade Caucasian female who is currently receiving special education services according to her individualized education plan. Student C is eligible for services under the category of specific learning disability. She also has documented anxiety and receives speech and language therapy and attends social skills counseling once a week. Student C has made tremendous progress this year, as her anxiety had prevented her from entering the school last year. Student C has difficulty acquiring new skills and attending during instruction. Student C is very reflective and realizes when she does not understand a concept or directions and will ask for the support she needs.

Participant D. Student D is a sixth grade Hispanic male who is currently receiving special education services from his individualized education plan. Student D is eligible for services under the category of Other Health Impairment. He also has documented ADHD, Oppositional Defiant Disorder, Depression, Anxiety, Trichotillomania, and characteristics consistent with an Autism Spectrum Disorder. Student D attends social skills counseling once a week.

Participant E. Student E is a sixth grade Caucasian male who is currently receiving special education services according to his individualized education plan. Student E is eligible for services under the category of other health impairment. He also has documented anxiety and attention deficit disorder and receives speech and language therapy and occupational therapy once a week. Student E is a very outgoing and enthusiastic young man who received his education in an inclusion setting in fifth grade; however, his teachers and parents felt he required additional support and changed his placement to a resource classroom for sixth grade. Although Student E is very capable of completing the work required within the resource center, he often becomes discouraged if he does not immediately understand a new concept. When this occurs, he will state that he is unable to complete the work and will not attempt it without intensive teacher prompting and support. On some occasions, Student E will leave answers blank and state he did not know what to do, despite previously demonstrating mastery of the skill.

Participant F. Student F is a sixth grade African American male who is currently receiving special education services from his individualized education plan. Student F is eligible for services under the category of other health impairment. Student F often exhibits behaviors of noncompliance and defiance in the classroom. When he is asked to

complete work or to follow along, Student F disregards his teachers' directions and continues engaging in what he was previously doing. Student F has great difficulty acquiring new skills in math and sharing his thinking during language arts upon reading a story. Student F often refuses teacher assistance, although he requires a great deal of prompting and support to be successful.

Participant G. Student G is a sixth grade Caucasian female who is currently receiving special education services according to her individualized education plan. Student G is eligible for services under the category of specific learning disability. Student G is a quiet and shy young lady who benefits from a lot of prompting and clarification of directions. She is a hard worker and strives to please her teachers, which has made her successful this year. Student G has difficulty retaining previously taught information and requires a frequent review of older concepts to help maintain her skills.

Research Design

The study utilized a single subject design with multiple-baselines across participants. The independent variable in the study was the use of teacher-created Kahoot! games. The dependent variables in the study were student vocabulary acquisition and retention. The intervention was designed to increase the students' vocabulary acquisition and retention skills. During Phase A, baseline, the students received typical instruction. During Phase B, intervention, the addition of Kahoot! as a game-based learning platform was added to instruction.

Materials

The materials used in this study were published by Houghton Mifflin Harcourt. Their reading program *Journeys Common Core* is aligned to the sixth grade common

core standards. The Vocabulary in Context cards, the Anchor texts, and the corresponding story in the Write-In Reader were used during the study.

Procedure

Pre-existing data collected September 2016 through December 2016 were used to establish baseline data for vocabulary acquisition and retention for each student. Phase A, baseline, continued for three of the participants through the end of February 2017. Phase B, intervention, began for the remaining four participants. After nine weeks, all seven participants entered Phase B and began receiving the intervention.

The unit four vocabulary words were taught to all seven participants during their language arts class. The ten vocabulary words were presented to the participants one at a time using a context-vocabulary card containing an image relating to the term. Upon showing the context-vocabulary word, each word's meaning was discussed as a class. The participants then copied down the definition for the word into their vocabulary notebook. Finally, real-world connections were made to the word and shared by the participants. This procedure was repeated for each of the ten words. The participants then reviewed their vocabulary words each morning at the start of language arts class for a two week period. Within that two week timeframe, two stories were read that contained the newly learned vocabulary words.

During Phase B, intervention, students played a Kahoot! every other day during their scheduled support period. The Kahoot! contained ten questions and was presented in multiple formats: identifying the word's definition or selecting which word best completes the sentence. The directions of how to play Kahoot! were carefully explained to the four participants receiving the intervention. After each question was answered, it

was discussed why the other three answer choices were incorrect as well as why the correct answer was correct. The same procedures were implemented for units five and six of the vocabulary lessons.

Survey

At the end of the intervention, the students’ attitudes towards the use of Kahoot! were assessed using a Likert scale survey. The 1-5 rating scale was explained to each student: 5 representing strongly agree, 4 for agree, 3 for undecided, 2 for disagree, and 1 representing strongly disagree. Each student completed the student satisfaction survey. A copy of the student satisfaction survey can be seen in Figure 1.

Vocabulary Games with Kahoot! 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. Using Kahoot! kept me on task.					
3. Using Kahoot! was fun.					
4. Using Kahoot! helped me learn new vocabulary words.					
5. I would rather use technology to learn than paper and pencil.					
6. I would like to use Kahoot! in other classes to help me learn.					
7. I felt prepared for tests after using Kahoot!.					
8. I looked forward to using Kahoot!.					
9. I would like to tell my friends and other students about Kahoot!.					

Figure 1. Student satisfaction survey for Kahoot!

Data Analysis

After the two weeks of vocabulary instruction for each unit, the participants were given a vocabulary acquisition assessment. The participants' scores were recorded in an Excel spreadsheet. Three weeks after the initial vocabulary instruction, the participants were assessed on their vocabulary retention. The retention assessments combined vocabulary terms from multiple units to ensure the participants were truly retaining the terms and not remembering just the most recent vocabulary. The participants' scores were recorded in an Excel spreadsheet. The Excel data was then graphed and analyzed for trends. A visual representation of the data allowed the researcher to analyze the effects the independent variable had on each student in relation to the dependent variables of vocabulary acquisition and retention.

Chapter 4

Results

Vocabulary Acquisition and Retention

This study utilized a multiple baseline across participants design to research the following questions:

1. Will the use of Kahoot! impact the vocabulary acquisition of students with learning disabilities and other health impairments in a sixth grade resource language arts classroom?
2. Will the use of Kahoot! impact the vocabulary retention of students with learning disabilities and other health impairments in a sixth grade resource language arts classroom?

The students' vocabulary acquisition scores were obtained through a series of application-style vocabulary assessments. The students' retention scores were obtained through a series of assessments that required the students to create their own original sentence that correctly used and demonstrated their understanding of the vocabulary words. The retention assessments were given after instruction on the vocabulary unit was complete. The means and standard deviations of the students' scores were calculated and are shown in Table 2.

Table 2

Vocabulary Acquisition and Retention: Mean and SD across Participants

	<u>Acquisition</u>				<u>Retention</u>			
	Baseline		Intervention		Baseline		Intervention	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	%	%	%	%	%	%	%	%
Student A	26.67	0.06	100.00	0	33.33	0.12	90.00	0.11
Student B	46.67	0.06	95.00	0.12	20.00	0.20	73.30	0.24
Student C	50.00	0.10	100.00	0	20.00	0.20	90.00	0.17
Student D	46.67	0.12	96.70	0.08	20.00	0.20	86.70	0.16
Student E	23.33	0.14	100.00	0	16.67	0.15	100.00	0
Student F	18.33	0.15	93.30	0.12	0	0	73.30	0.12
Student G	46.67	0.10	100.00	0	33.33	0.10	86.70	0.12

Individual Student Results

Student A is a 12 year old Caucasian male receiving special education services under the eligibility category of specific learning disability. Student A's mean score for vocabulary acquisition during baseline was 26.7%. Student A's mean score for vocabulary acquisition increased to 100% during intervention. During baseline, Student

A's mean score for vocabulary retention was 33.3%. Student A's mean score for vocabulary retention increased to 90.0% during intervention. Student A's scores are shown in Figure 2. Student A's scores increased markedly when the intervention was implemented.

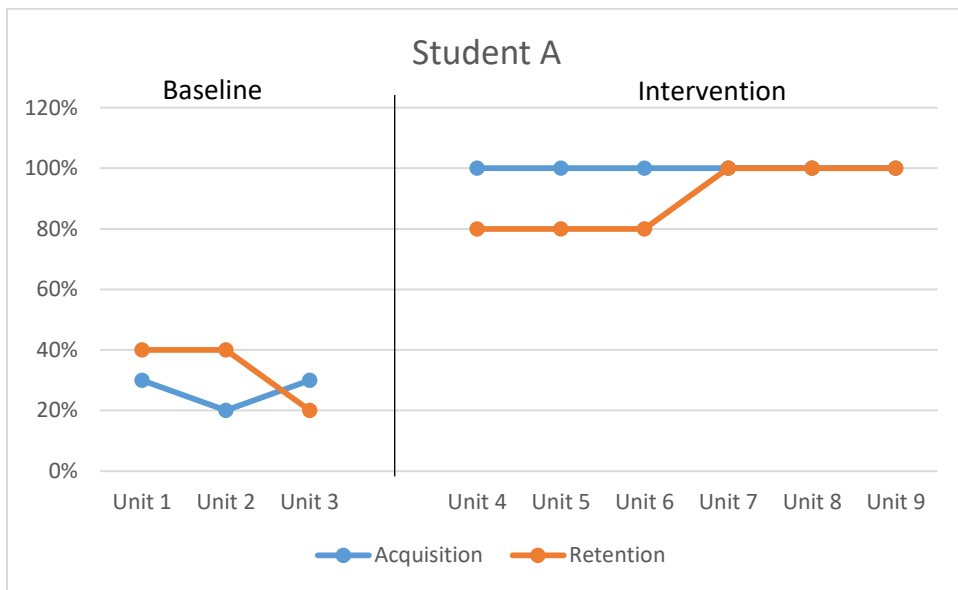


Figure 2. Student A's vocabulary acquisition and retention scores

Student B is a 12 year old Caucasian male receiving special education services under the eligibility category of other health impairment. During baseline, Student B's mean score for vocabulary acquisition was 46.7%. Student B's mean score for vocabulary acquisition increased to 95.0% during intervention. Student B's mean score for vocabulary retention during baseline was 20.0%. Student B's mean score for vocabulary retention increased to 73.3% during intervention. Student B's scores are

shown in Figure 3. Student B's scores were variable during baseline but steadily increased when the intervention is implemented.

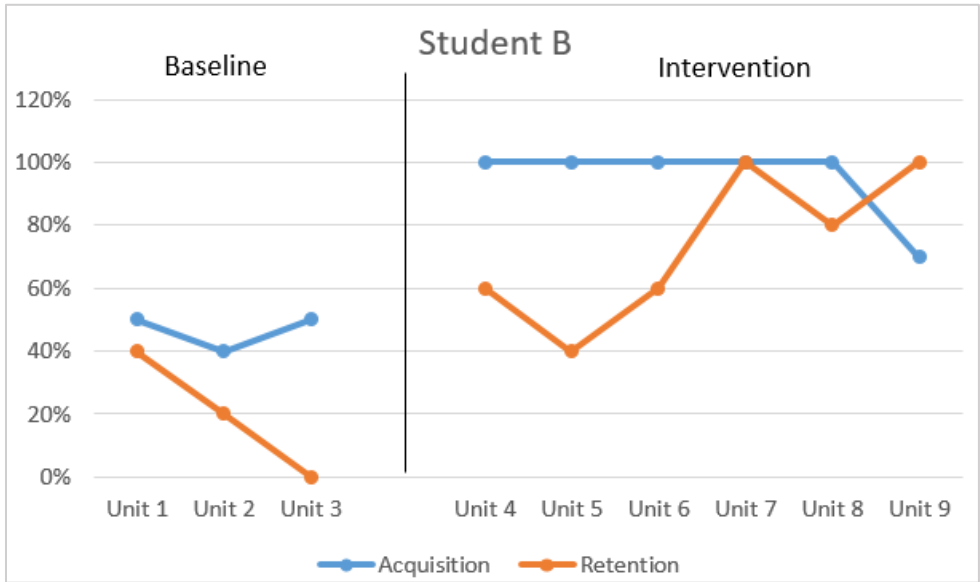


Figure 3. Student B's vocabulary acquisition and retention scores

Student C is a 12 year old Caucasian female receiving special education services under the eligibility category of specific learning disability. During baseline, Student C's mean score for vocabulary acquisition was 50.0%. Student C's mean score for vocabulary acquisition increased to 100.0% during intervention. Student C's mean score for vocabulary retention during baseline was 20.0%. Student C's mean score for vocabulary retention increased to 90.0% during intervention. Student C's scores are shown in Figure 4. Student C's scores increased markedly when the intervention was implemented.

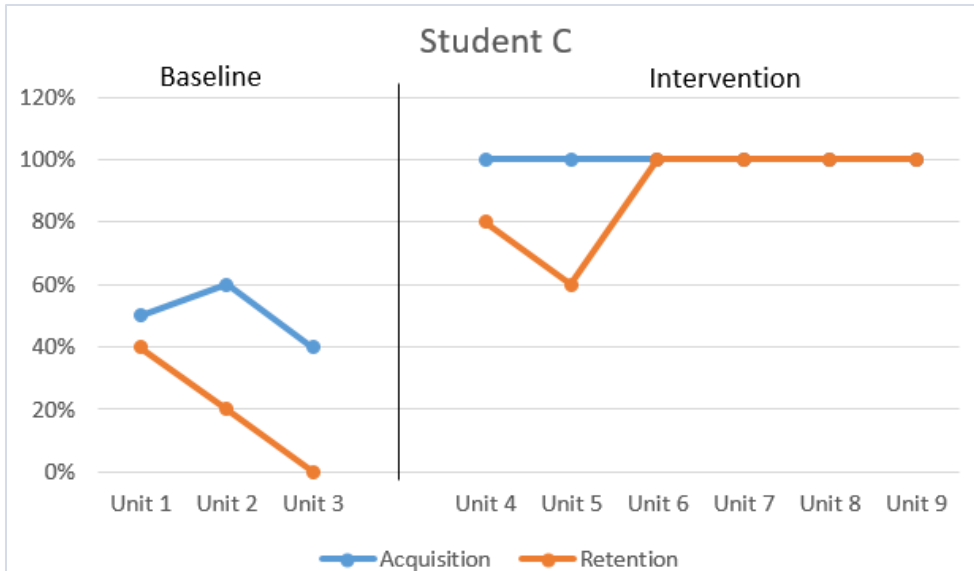


Figure 4. Student C’s vocabulary acquisition and retention scores

Student D is a 12 year old Caucasian male receiving special education services under the eligibility category of other health impairment. During baseline, Student D’s mean score for vocabulary acquisition was 46.7%. Student D’s mean score for vocabulary acquisition increased to 96.7% during intervention. Student D’s mean score for vocabulary retention during baseline was 20.0%. Student D’s mean score for vocabulary retention increased to 86.7% during intervention. Student D’s scores are shown in Figure 5.

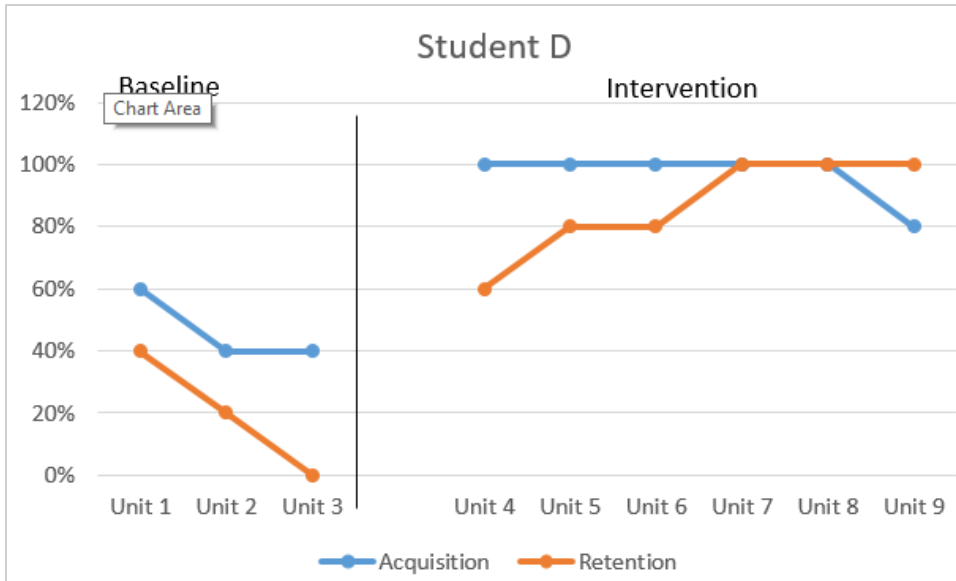


Figure 5. Student D's vocabulary acquisition and retention scores

Student E is a 12 year old Caucasian male receiving special education services under the eligibility category of other health impairment. During baseline, Student E's mean score for vocabulary acquisition was 23.3%. Student E's mean score for vocabulary acquisition increased to 100% during intervention. Student E's mean score for vocabulary retention during baseline was 16.7%. Student E's mean score for vocabulary retention increased to 100% during intervention. Student E's scores are shown in Figure 3. Student E's scores were variable during baseline, yet increased and remained consistent when the intervention was implemented.

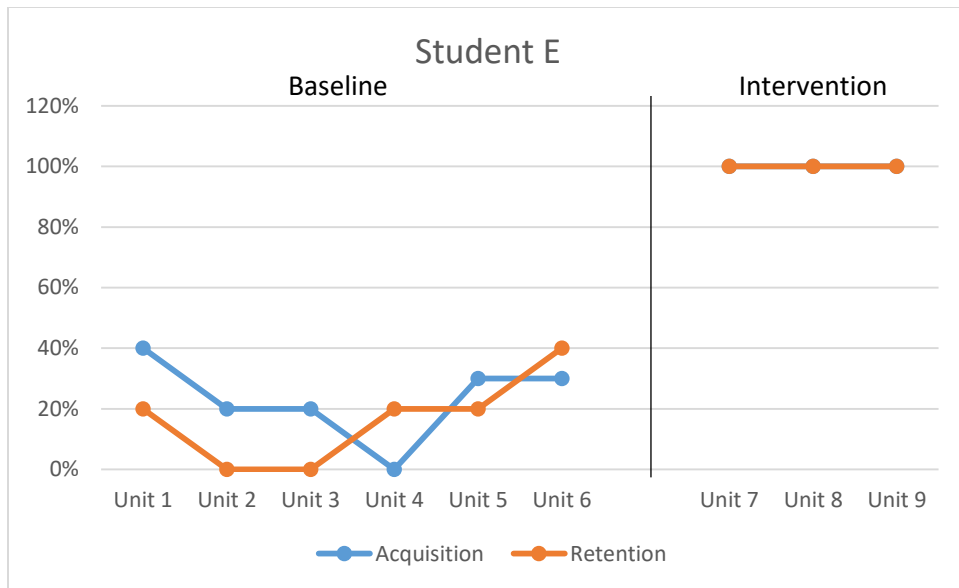


Figure 6. Student E’s vocabulary acquisition and retention scores

Student F is an 11 year old African American male receiving special education services under the eligibility category of other health impairment. During baseline, Student F’s mean score for vocabulary acquisition was 18.3%. Student F’s mean score for vocabulary acquisition increased to 93.3% during intervention. Student F’s mean score for vocabulary retention during baseline was 0.0%. Student F’s mean score for vocabulary retention increased to 86.7% during intervention. Student F’s scores are shown in Figure 7. Student F’s acquisition scores followed an increasing trend during baseline, and increased markedly when the intervention was implemented. Student F’s baseline scores for acquisition remained constant and also increased markedly after the implementation of the intervention.

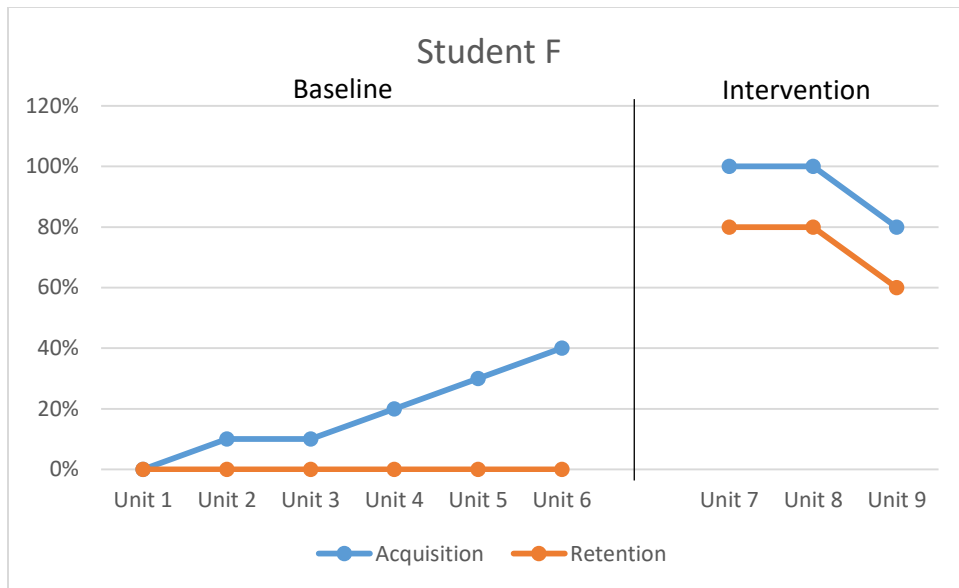


Figure 7. Student F's vocabulary acquisition and retention scores

Student G is an 11 year old Caucasian female receiving special education services under the eligibility category of specific learning disability. During baseline, Student G's mean score for vocabulary acquisition was 46.7%. Student G's mean score for vocabulary acquisition increased to 100% during intervention. Student G's mean score for vocabulary retention during baseline was 33.3%. Student G's mean score for vocabulary retention increased to 86.7% during intervention. Student G's scores are shown in Figure 8. Student G's scores were variable during baseline and increased markedly when the intervention was implemented.

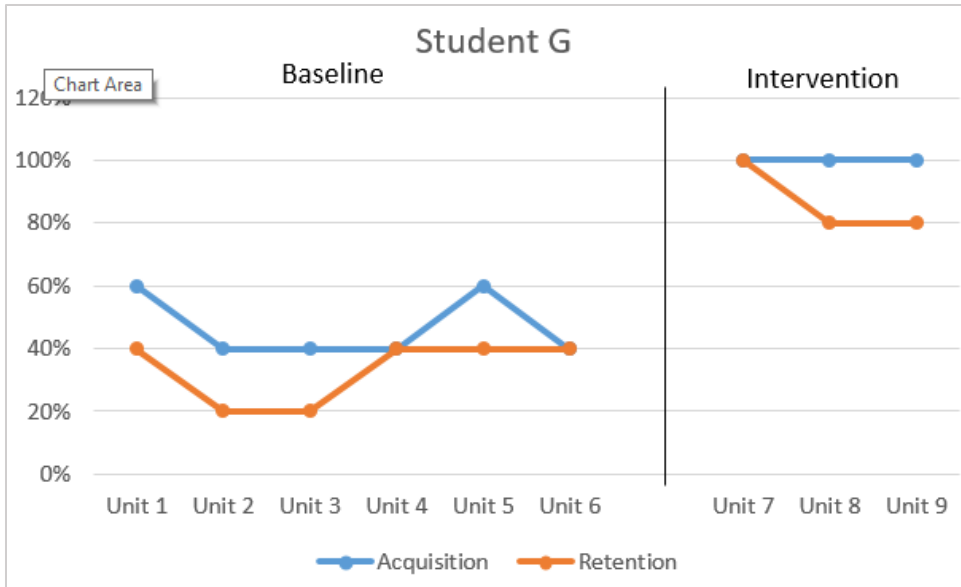


Figure 8. Student G's vocabulary acquisition and retention scores

Survey Results

This study also researched the participants' satisfaction with the intervention by asking the research question, are students with learning disabilities and other health impairments satisfied with the use of Kahoot! in the resource language arts classroom? All participants completed a Likert scale satisfaction survey upon completion of the study. The results were tallied and calculated into percentages. Table 3 shows mean student responses to each question.

Table 3

Student Satisfaction Survey

Statement	5	4	3	2	1
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
	(%)	(%)	(%)	(%)	(%)
1. I found Kahoot! easy to use.	71	29	0	0	0
2. Using Kahoot! kept me on task.	86	14	0	0	0
3. Using Kahoot! was fun.	86	14	0	0	0
4. Using Kahoot! helped me learn new vocabulary words.	86	14	0	0	0
5. I would rather use technology to learn than paper and pencil.	71	14.5	14.5	0	0
6. I would like to use Kahoot! in other classes to help me learn.	100	0	0	0	0
7. I felt prepared for tests after using Kahoot!.	57	43	0	0	0
8. I looked forward to using Kahoot!.	100	0	0	0	0
9. I would like to tell my friends and other students about Kahoot!.	43	57	0	0	0

All seven participants completed the Likert satisfaction survey. Five of the participants strongly agreed that Kahoot! was easy to use while two participants agreed. Six of the participants strongly agreed using Kahoot! kept them on task while one participant agreed. Six of the participants strongly agreed that using Kahoot! was fun while one participant agreed. Six of the participants strongly agreed that using Kahoot! helped them to learn new vocabulary words while one participant agreed. Five of the participants strongly agreed they would rather use technology to learn than paper and pencil, while one participant agreed and one participant was undecided. All seven participants strongly agreed they would like to use Kahoot! in other classes to help them learn. Four of the participants strongly agreed that they felt prepared for tests after using Kahoot! while three participants agreed. All seven participants strongly agreed that they looked forward to using Kahoot!, and all participants strongly agreed or agreed that they would like to tell their friends about Kahoot!

Chapter 5

Discussion

The purpose of this study was to evaluate the efficacy of Kahoot! on vocabulary acquisition and retention of students with learning disabilities and other health impairments. This study utilized a multiple baseline design across seven participants to determine the efficacy of the game-based learning platform, Kahoot!. Vocabulary acquisition was measured by the number of correct responses on an application-style assessment at the end of each vocabulary unit. Vocabulary retention was measured by the number of sentences each participant could create using the previously learned vocabulary words after the unit ended.

Summary of Findings

Using technology to teach vocabulary has been shown to be effective in increasing students' vocabulary acquisition (Huang, 2015). The results of the seven participants in the present study corroborate the research of Huang (2015) in that the use of technology to reinforce vocabulary instruction resulted in an increase of vocabulary acquisition. Four of the seven students, Students A, C, E, and G, achieved a mean score of 100% in the intervention phase for vocabulary acquisition. Despite mean scores during the baseline phase of 50% or below. Students B, D, and F achieved mean scores during the intervention phase for vocabulary acquisition ranging from 93%-95% despite baseline mean scores which were 47% or below.

The results of this study also corroborate the research of Johnson and colleagues (1987) in which the researchers suggested vocabulary instruction using technology is effective at promoting acquisition for students with learning disabilities if the words are

presented in manageable quantities. The present study presented ten vocabulary words to the students in each unit. Students A, C, and G, who are classified with a learning disability, increased their mean scores for vocabulary acquisition after the intervention was applied by 50% and each had a mean score of 100% during intervention.

Previous research also indicates repeated exposure to newly learned vocabulary (Rupley et al., 2002; NPR, 2002) in addition to instruction incorporating technology is effective in promoting retention of vocabulary (Huang, 2015; Johnson et al., 1987). Five of the seven students, Students B, C, D, E, and F, scored a mean of 20% or less during the baseline phase for vocabulary retention. Students A and G scored a mean of 33% during the baseline phase. After the intervention was applied, Students A, C, D, E, and G increased their mean scores for vocabulary retention to 86% or higher.

Students B and F, who are both classified with other health impairments, increased their mean scores for vocabulary retention to 73%. Although their mean score was lower than the other five participants, Student B demonstrated a 53% increase in mean score while Student F demonstrated a 73% increase in mean score. The results also support the findings of Kilickaya and Krajka (2010). In Kilickaya and Krajka's (2010) study, it was suggested that incorporating technology into instruction was found to make vocabulary instruction more effective. The results for the seven participants in this study corroborate these findings.

Stowell and Nelson (2007) found that student response systems may increase participation and help students maintain a positive outlook while learning. All seven participants in the present study indicated that they looked forward to using Kahoot! and that they would like to use Kahoot! in their other classes to learn. These results align with

the findings of Stowell and Nelson (2007). In addition, all seven participants indicated that using Kahoot! helped them learn new vocabulary words and that it was fun. The findings of Bartsch and Murphy (2011) suggest the use of a student response system can lead to an increase in student learning and engagement. In addition, Wang and Lieberoth (2016) suggest the audio and music used in Kahoot! create a positive learning experience for the users, which may encourage participation. The results of this study corroborate the findings of Bartsch and Murphy (2011) and Wang and Lieberoth (2016).

Limitations

The present study may have been impacted by several limitations. The participant size was limited to seven sixth-grade students who are classified with either a learning disability or other health impairment and receive instruction in a replacement language arts classroom. Replicating the present study using a larger sample size would help validate the efficacy of the intervention beyond the seven participants in this study.

The duration of the study was also limited due to a long approval process from the Institutional Review Board and district-mandated curricular expectations, snow days, and other school-wide events that postponed data collection.

During the intervention, one participant experienced a change in medication, which resulted in drastic behavioral changes for a period of two months. On occasion, the participant would refuse to participate in the assessment activities.

Implications and Recommendations

Implications for practice include the need for teachers to have access to technology within their classrooms and feel comfortable utilizing that technology within their instruction. Kilickaya and Krajka (2010) found that although technology appears to

make instruction meaningful to students, teachers are unsure how to incorporate technology into their instruction. Teachers should receive professional development to incorporate game-based learning platforms into their daily instruction to help students remain engaged, motivated, and to promote retention.

Implications for future research include recommendations for researchers to replicate the present study or conduct similar studies using a larger sample size. Researchers should also investigate if an increase in vocabulary acquisition and retention through the use of a game-based learning platform can eventually lead to an increase in reading comprehension for students with learning disabilities and other health impairments. In addition, researchers can test other game-based learning platforms and determine which appear to be the most effective in increasing learning outcomes.

Conclusions

The results of this study seem to indicate that using Kahoot! to help students with learning disabilities and other health impairments to acquire and retain vocabulary words is effective. All seven students showed an increase in their mean scores from the baseline phase to the intervention phase for both vocabulary acquisition and retention. The seven students were engaged during each Kahoot! review session and indicated on the student satisfaction survey that they found Kahoot! fun, they looked forward to using it, and that it kept them on task.

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