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The effect of the video game Quizlet on the acquisition of science vocabulary for children with learning disabilities

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THE EFFECT OF THE VIDEO GAME QUIZLET ON THE ACQUISITON OF SCIENCE VOCABULARY FOR CHILDREN WITH LEARNING DISABILITIES

by
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Dedications

I would like to dedicate this thesis to my family, friends and especially my colleagues. Without their support and encouragement, none of this would have been possible.

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I would like to express my appreciation to Dr. Amy Accardo for her assistance, guidance, and support through my research process.

Abstract

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2016-2017
Amy Accardo, Ed. D.
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The purposes of this study were (a) to determine if using the video learning game Quizlet in a middle school resource classroom increases science vocabulary acquisition of students with learning disabilities, (b) to determine if using the video learning game Quizlet in a middle school resource classroom increases the student engagement/on-task behavior of students with learning disabilities, and (c) to evaluate student comfort and satisfaction in using the video learning game Quizlet in a middle school resource classroom. Six middle school students, three female and three male participated in the study. A single subject design with ABAB phases was utilized over eight weeks. Results show that all students increased their science vocabulary acquisition and increased their on-task behaviors. A follow-up student satisfaction survey determined that the intervention was acceptable to all students. Further research to assess the effects of Quizlet is recommended.

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Chapter 1

Introduction

As technology has evolved, so has the ability to actively engage students both inside and outside of the classroom. According to Edyburn (2006), the use of educational technology has been embraced by many educators and is continuing to become an integral part of learning. With the continuous growth of technology, students with learning disabilities now have the opportunity to access programs that read text aloud, as well as programs that type text from speech (Edyburn, 2006). Technology has become student-centered, and allows students with learning disabilities to be engaged in their own learning process (Edyburn, 2006).

According to Kim, Woodruff, Klein, and Vaughan (2006) students with learning disabilities often struggle with vocabulary. The ability to read and comprehend is essential to school success, yet more than 90% of students with learning disabilities demonstrate reading difficulties (Kim et al., 2006). When errors occur in reading, students with learning disabilities may receive less than complete information from the text, and comprehension may be adversely affected (Forgrave, 2002).

Students who struggle to read on grade level often have trouble in classrooms that require them to read from a grade level textbook. According to Cohen (2012), many middle school classrooms expect students to read the textbook to learn, assuming they understand how to comprehend the text and content-area vocabulary. This is especially true in a middle school science classroom where new vocabulary is introduced on a weekly basis (Cohen, 2012). Students can become overwhelmed and frustrated in learning tasks that include written work, like vocabulary definitions and terminology

(Vaidya, 1999). Vaidya (1999) suggests that children with learning disabilities lack the metacognitive skills and learning strategies to overcome these difficulties on their own.

Moreover, students with learning disabilities struggle with reading comprehension and vocabulary in content areas such as science because there is often a discrepancy between their reading ability and requirements of science curriculum (Seifert & Espin, 2012). Dieker, Finnegan, Grillo and Garland (2013) suggest that as science classrooms become inclusive, teachers must create multisensory instruction to meet the needs of a diverse student population.

Additionally, with each new unit in science comes new vocabulary. Much of this new terminology expands on previous units of study while also introducing new important information. This may prove challenging for students with learning disabilities as processing speed deficits may interfere with their student language growth in content-specific areas like science (Dieker, Finnegan, Grillo, & Garland, 2013).

Park and colleagues (2012), suggest student engagement is fundamental to academic achievement. In an inquiry-based science classroom it is important for students to be engaged and on-task when given multi-step procedures (Park et al., 2012). Therefore, it is important to keep students on-task by engaging them in the learning process. Research on on-task behaviors suggests that student academic disengagement presents behaviorally and cognitively, leading to poor academic outcomes (Archambault, Janosz, Morizot, & Pagani, 2009). According to Vaidya (1999), students should work to develop strategies to plan, monitor, and be aware of their behaviors and effects of their behaviors, in order to achieve academic success. If students can develop these engagement skills independently, it leads to positive life outcomes and productive

adulthood (Vaidya, 1999).

Technology-based learning games have been growing in popularity for educators as they offer a learner-centered approach and increase student buy-in for learning (Dreyer, 2014). Online video games allow students to access textual, visual and auditory information with the click of their mouse. Certain computer programs are now used in classrooms to support the literacy efforts of students with learning disabilities (Edyburn, 2006). One such program, Quizlet, has multiple features that may engage students with learning disabilities (Annetta, 2008). Quizlet is an interactive website that allows students to create their own flashcards online (Annetta, 2008). The website allows students to create an unlimited amount of vocabulary sets customized for their own needs. Students have the ability to add pictures, use a text-to-speech feature, and study their vocabulary using multiple engaging games (Annetta, 2008). It is important for educators to understand how the increased use of technology in the classroom can empower students with learning disabilities to work more independently (Forgrave, 2002).

Statement of the Problem

With the increased reading requirements at the middle school level, students with learning disabilities encounter extensive content-area vocabulary, especially in the science classroom. According to Bryant, Goodwin, Bryant & Higgins (2003), these students are required to understand meanings, relationships, and contextual interpretations of new vocabulary words. Students with learning disabilities possess widely disparate vocabulary knowledge compared to their typically developing peers (Bryant et al., 2003). The present study is designed to address this discrepancy by researching if the video game Quizlet will increase science vocabulary acquisition, as

well as student engagement, for students with learning disabilities.

Significance of the Study

This present study will add to the existing literature on the effectiveness of video game technology with students with learning disabilities. There is limited research on the use of video games, especially with science vocabulary at the middle school level. Marino and Beecher (2010) showed that video games can support the diverse learning needs of all students, and can function as an intervention for those who are struggling academically by allowing for independent practice and instructional support.

This study builds on the research recommendations of Marino and Beecher (2010) by investigating the effectiveness of the video game Quizlet on students with learning disabilities on the learning of new vocabulary and on-task behavior. The video learning game Quizlet will offer the students with learning disabilities choices in order for the students to work at their own academic level. Quizlet will also allow the students to work independently at their own pace and receive additional instructional support.

Purpose of Study

This study will investigate the use of the video learning game Quizlet by students with learning disabilities in a middle school resource classroom. Specifically this study will utilize a single subject ABAB research design over the course of 8 weeks. Students will use individual Chromebooks to access teacher-made Quizlets based on science vocabulary units.

The purposes of this study are to: a) determine if using the video learning game Quizlet will increase the science vocabulary acquisition of students with learning disabilities, b) determine if the video learning game Quizlet will increase the on-task

behavior/engagement of students with learning disabilities, and c) evaluate student satisfaction using Quizlet in the resource classroom. Student academic performance will be measured in terms of vocabulary acquisition, and student engagement will be measured in relation to on-task behaviors.

Research Questions

1) Will use of the video learning game Quizlet increase the science vocabulary acquisition of students with learning disabilities in a middle school resource classroom?

2) Will use of the video learning game Quizlet increase the on-task behavior/engagement of students with learning disabilities in a middle school resource classroom?

3) Are students satisfied with using the video learning game Quizlet?

Chapter 2

Review of the Literature

Vocabulary knowledge is an important skill when students are learning to comprehend text. According to Cohen (2012) in order to comprehend text, students must have a strong literacy background and strong vocabulary knowledge. Students with learning disabilities often have inadequate vocabulary knowledge and difficulty learning new vocabulary as a language-based activity (Jitendra, Edwards, & Sacks, 2004). Vocabulary is especially important in the content area of science, which involves a great deal of academic terminology (Cohen, 2012). Technology may be one tool to support students in acquiring stronger vocabulary knowledge.

Teaching Vocabulary to Students with Learning Disabilities

Multiple instructional techniques are used to teach vocabulary to students with learning disabilities (Foil & Alber, 2002). Research has shown that there is no single way to teach vocabulary to any age group or ability level, and that it is helpful to use a combination of strategies (Foil & Alber, 2002). Woodfire, Baptista, and Wright (2008) report that learning vocabulary occurs through interaction with rich learning environments and results from engaging in authentic activities.

Bryant, Goodwin, Bryant, and Higgins (2003) identified the use of explicit instruction as beneficial for students with learning disabilities struggling to understand word-learning strategies. Instruction for students with learning disabilities should concentrate on the individual child, and teach them to process and understand new words and their meanings (Bryant et al., 2003). Nagy (1988) reports that instruction in developing deep word-knowledge must include supports for students to link the meaning

of new words to prior learning. In order for this to be done, active engagement is critical to learning vocabulary for students with learning disabilities (Nagy, 1988).

Vocabulary acquisition is especially important in the science classroom, where new words may be introduced on a weekly basis. Cohen suggests that in order for students to comprehend science material, they must be able to understand new terms and concepts, and be capable of linking the vocabulary to real-life (2012). Bryant, Goodwin, Bryant, and Higgins (2003) suggest that mastery in vocabulary acquisition is more likely to occur when the learner makes his or her own contribution to learning.

Moreover, giving students with learning disabilities time to read may help increase their vocabulary (Jitendra et al., 2004). When students have a chance to read in their area of interest, they are introduced to new vocabulary. They use word strategies to learn the definition of the word and see an example of how that word is used. After multiple introductions to a certain word, the student is able to master that word in context. According to Jitendra et al. (2004), "Students who read independently for at least ten minutes each day appear to experience substantially higher rates of vocabulary growth than students who do very little independent reading" (p. 300).

In the same way that there is a need for more independent reading, teachers should allow students to have frequent practice with new vocabulary words in context (Foil & Alber, 2002). Bryant et al. (2003) report that students with learning disabilities require opportunities to practice vocabulary in order to retain the meaning of new words. Similar to Bryant et al., Nagy (1988) suggests that multiple repetition and student engagement are important to vocabulary acquisition and understanding of text.

Computer-Assistive Instruction

Jitendra et al. (2004) also found that effective computer-assistive instruction (CAI) is an aid to teacher instruction of vocabulary. According to Jitendra et al. (2004), CAI can be defined as an interactive instructional technique where a computer is used to present the instructional material and monitor the learning that takes place. CAI allows students to have material presented on a computer screen in lieu of a worksheet-type activity. The researchers found that with CAI, teachers are able to individualize the learning experience to the needs of the students (Jitendra et al., 2004).

Furthermore, CAI uses a combination of text, graphics, sound and video to enhance the learning process (Jitendra et al., 2004). Imagery plays an important role in learning. Imagery allows students to connect words and their meaning, which leads to greater retention of vocabulary (Cohen, 2012). An illustration can act as a visual clue which can make words more concrete and understandable, and this strategy may be especially helpful in science. The video learning game Quizlet allows students to add a picture to their vocabulary definitions, which as a result allows them to make a visual connection to the new word.

Video Game Technology in Education

Edyburn (2002) argues that technology is not being employed as widely in the classroom as much as it should be. Many teachers do not realize how technology can benefit their students (Forgrave, 2002). According to Marino (2010), students are increasingly turning to technology as a means to gather information, communicate, and learn. According to Marino and Beecher (2010) research suggests that secondary students

with learning disabilities often rely on technology more than their peers without learning disabilities.

A study conducted by Marino, Israel, Beecher, and Basham (2013) looked at video games and their impact within science classrooms. The study involved 878 sixth through ninth grade students and 34 teachers from 14 states (Marino et al., 2013). Marino et al. found that students had the ability to conduct scientific inquiry-based learning with a video game called *River City* (2013). *River City* required students to interact with virtual residents of a nineteenth century city and study the effects of city pollution in order to figure out why they were becoming ill (Marino et al., 2013). Students learned about the causes and effects of pollution through the video game. Marino et al. (2013) report that students increased language use, vocabulary, and knowledge about cities from their pre-assessment to their post assessment. Students were able to connect with the material in ways that they could not with traditional teaching and textbooks (Marino et al., 2013).

Science vocabulary at the middle school level can be very challenging for students with learning disabilities. Marino and Beecher (2010) suggest that students with learning disabilities can be successful in the science classroom when the instruction fits their exceptional learning styles and capabilities. Lewis (1998) describes technology as having two purposes: to build on individual strengths and to compensate for a student's disability to enable them to better perform on a given task. Research supports a technology-enhanced science environment as beneficial to students with learning disabilities (Marino & Beecher, 2010). Marino and Beecher (2010) suggest that

technology is our present and future and its presence in the classroom will continue to increase.

However, video game technology is not intended to replace the instruction of a teacher, but instead to enhance student outcomes (Marino & Beecher, 2010). According to Annetta (2008), video games should be seen as supplements to teaching that engage students in a way that they are familiar with and in a format they feel comfortable using. Furthermore, Annetta (2008) reports an advantage of technology-based games is that they generate a higher level of positive emotional engagement in students. In return, the video games make the learning experience more motivating and appealing while improving the students' participation and achievement (Annetta, 2008). Video games are not simply for entertainment purposes. They require the use of many skills such as logic, self-questioning, memory, problem solving, visualization, critical thinking, and the use of discovery techniques (Annetta, 2008). Annetta (2008) argues that video games have the ability to help students be more prepared after graduation in professions that require mathematics and science skills. Video games in education give learners the opportunity to learn by doing (Annetta, 2008).

The Benefits of Video Learning Games

According to Lim, Lim and Lazim (2012), traditional teaching techniques tend to be designed for auditory learners. This means concepts are typically presented in a sequential, step-by-step fashion, practiced with repetition, assessed under timed conditions, and then reviewed (Lim et al., 2012). However this approach isn't always beneficial for students who are visual-spatial learners. Visual-spatial learners tend to understand concepts better when they are presented within a context and related to other

concepts (Lim et al., 2012). Lim, Lim and Lazim state an advantage of video games is that they can address many of Gardner's multiple intelligences either separately or collectively (2012). Video games, such as Quizlet, have the ability to support both the auditory and visual-spatial learner. For the auditory learner, Quizlet has a feature where the student is able to hear the vocabulary word and definition aloud. For the visual-spatial learner, there is a feature to study vocabulary using an interactive matching and gravity game where the definitions and vocabulary words fall from the screen.

Granic, Lobel, and Engels (2014) reviewed literature on the benefits of video games. Granic et al. report that video games motivate students, improve their cognitive abilities and help strengthen their social skills through interactions with peers (2014). The researchers further suggest that video games can be played cooperatively or competitively, both of which actively engage the player. According to Siegle, video games provide students with immediate feedback that applaud their efforts in learning (2015). There are cognitive and social benefits of playing video games (Granic et al., 2014). Video games also aid in the development of problem-solving skills (Granic et al., 2014). Problem-solving skills are a critical component in an inquiry-based science classroom.

Video Learning Games as Interventions

According to Marino and Beecher (2010), video games can support the diverse learning needs of all students, and can function as an intervention for those who are struggling academically. These colleagues concluded that there is potential in using video games along with Response to Intervention (RTI) in the science classroom. The findings showed that video games can be used to assist students with learning disabilities because

they allow for independent practice and instructional support. Marino et al. studied 57 students using Universal Design for Learning (UDL), and found that video games and supplemental texts are effective in creating student-centered learning environments (2013). Moreover, Gee (2003) suggests that video games may be an asset to science instruction and an enhancement to student academic performance.

Quizlet

One video learning game Quizlet may be an effective way to teach science vocabulary for students with learning disabilities. On the Quizlet website, the students have the ability to create their own customized vocabulary sets. Teachers also have the opportunity to create a "class" and share multiple sets of vocabulary from different units to their students. Quizlet has multiple features where the user can add pictures, have the words and definitions read aloud using text-to-speech, or star individual words that may be important or challenging for them (Annetta, 2008).

On the Quizlet dashboard, there are many options where the student can interact with the vocabulary words through video games. Some video game options include "Learn", "Match", and "Gravity". In the "Learn" mode, students are given the definition and asked to type the vocabulary word. Spelling does not count in this mode because students have the ability to override the answer if Quizlet says it is incorrect due to a spelling error. In the timed "Match" game, students are asked to drag the vocabulary word to its correct definition, which causes them both to disappear. Students have the options to practice all of their vocabulary words or just the starred words from their list. Finally, in the "Gravity" mode there is an easy, medium or hard level. In this video game, the definitions slowly fall from the sky towards Earth and the students are asked to type

in the vocabulary word. If they do not know the answer Quizlet will stop the game, reveal the correct answer, and the students are required to type in the correct answer before continuing with the game. Overall, there are many engaging features on the video learning game Quizlet that may help students learn vocabulary, as well as increase their time on-task.

Summary

This review of literature summarizes various ways that video games may be used to engage students with learning disabilities. When teaching vocabulary, students with learning disabilities may benefit from concrete definitions and a way to link the meaning of new words to previous learning. Students also may benefit with having frequent practice with new vocabulary words in order to aid in the student's retention of new meanings. Using video learning games in the science classroom makes the learning experience more motivating and engaging for students. Video games are appealing to students and help them become involved in their learning process.

Additionally, video games help in the development of problem-solving skills, which is especially important in an inquiry-based middle school science classroom. When teaching vocabulary, it is important to understand there are multiple types of learning styles. Video games are able to address both the visual-spatial and auditory learner. They provide students with immediate feedback that applaud their efforts in learning. Teachers are able to use this feedback to evaluate the individual student's strengths and weaknesses. Teachers can also use video games to monitor student work and time on task. As an intervention, video games may help students with learning disabilities become independent and receive additional support without being singled out.

This study aims to build on the recommendations of Granic, Lobel, and Engels (2014), and investigate the effect of a video game on student engagement. Additionally, the study will follow Cohen's (2012) lead, and utilize a vocabulary game to incorporate imagery into vocabulary instruction in an inquiry-based middle school science classroom. The video learning game Quizlet will be utilized and will offer students with learning disabilities choices enabling them to work at their own academic level. The present study will investigate the use of the video game Quizlet on student engagement, specifically their time on-task, and their science vocabulary acquisition.

Chapter 3

Methodology

Setting

School. The study was conducted at a middle school in a central New Jersey school district. The school district contains five schools: two elementary schools, one intermediate school, one middle school and one high school. The entire school district has 4,798 students and the middle school where the study was conducted has 816 students. A normal school day at the middle school runs for six hours and forty-seven minutes. The middle school has a two-day alternating block schedule, where the students have four classes each day that last eighty-two minutes.

According to the New Jersey Performance Report (New Jersey Department of Education, 2014), 53% of the students in the middle school are White, 40% are Asian-American, 4% Mexican-American and 3% African-American. There are 99 students in the middle school that have a disability that requires an Individualized Education Plan. English is the primary language spoken in the community, while some families also speak Chinese.

Classroom. The study was conducted in an eighth grade resource room. In the resource room, students receive additional support in each of their four content classes: math, language arts, science and social studies. Since there is not a different curriculum taught in the resource room, but rather reteaching of lessons, the students receive a pass or fail grade each marking period. There are two special education teachers in the classroom, in addition to two paraprofessionals, and one registered nurse. The classroom has a BrightLinks projector connected to a teacher desktop that can be displayed on the

large whiteboard at the front of the room. The resource room is in a general education social studies classroom and contains a set of twenty-five Chromebooks available to the students. Resource room is every B-Day from 9:35-11:00 A.M.

Participants

This study included six eighth grade middle school students, three female and three male. The student participants either have a documented disability as specific learning disability (SLD) or other health impaired (OHI). All students have an Individualized Education Plan (IEP) for their exceptional learning needs. Table 1 presents the general participant information.

Table 1

General Information of Participating Students

Student	Age	Grade	Classification	Baseline Vocabulary (%)
A	14	8	OHI	77.6
B	14	8	SLD	74.8
C	14	8	SLD	65.4
D	14	8	SLD	70.2
E	14	8	OHI	58.4
F	14	8	OHI	67.8

Participant 1. Student A is an eighth grade White female who is eligible for services under the category OHI. Student A receives instruction for English language arts and mathematics in a replacement small group setting. She receives social studies and science

in an ICS setting. Student A has epilepsy and is followed daily by a registered nurse. Her processing speed is much slower than her typical peers due to her health difficulties. Student A is a very friendly and hardworking student who goes out of her way to help others. She is kind to all of her teachers and peers.

Participant 2. Student B is an eighth grade White female who is eligible for services under the category SLD. Student B receives instruction for English language arts and mathematics in a replacement small group setting. She receives social studies and science in an ICS setting. Student B struggles with listening and reading comprehension. However, she will advocate for herself when she is confused.

Participant 3. Student C is an eighth grade White female who is eligible for services under the category SLD. Student C receives instruction for English language arts and mathematics in a replacement small group setting. She receives social studies and science in an ICS setting. Student C is very quiet in both the large and small group settings. She will not raise her hand and will only share out her thoughts when she is directly called on. Student C works hard to stay on task during class and requires frequent check-ins to ensure she is understanding.

Participant 4. Student D is an eighth grade African-American male who is eligible for services under the category SLD. Student D receives instruction for English language arts and mathematics in a replacement small group setting. He receives social studies and science in an ICS setting. Student D recently moved into the school district at the end of seventh grade. He is a very friendly student who is often distracted from academic tasks by socialization. He prioritizes socialization with friends over academics.

For example, he will engage other students in conversation instead of completing assignments.

Participant 5. Student E is an eighth grade White male who is eligible for services under the category OHI. Student E receives instruction for English language arts and mathematics in a replacement small group setting. He receives social studies and science in an ICS setting. Student E's major difficulties are in reading comprehension and written expression. He has ADHD and has trouble maintaining attention and focusing on tasks. He has a one-to-one paraprofessional in order to help keep him on task.

Participant 6. Student F is an eighth grade White male who is eligible for services under the category OHI. Student F receives instruction for English language arts and mathematics in a replacement small group setting. He receives social studies and science in an ICS setting. Student F has dysgraphia and requires the use of a Chromebook for the majority of any school classwork or homework assignment. He often rushes through assignments and has difficulty following directions, but has a strong recall memory.

Teacher. The special education teacher who conducted the study has been teaching as a special education teacher for three years. The teacher taught seventh grade for two years and eighth grade for one year. Additionally, she is responsible for writing student IEPs and attending related meetings. She teaches the replacement pre-algebra class, in addition to being a co-teacher in two ICS science classrooms and one ICS algebra classroom.

Materials

Six Chromebooks, a teacher desktop computer, BrightLinks projector, an iPhone timer, and the application Quizlet were used for the intervention. Students were shown how to access the teacher made Quizlet through the resource room Google Classroom. Students were able to choose their study preference from the Quizlet Dashboard. Figure 1 displays the Quizlet Dashboard choices available to students.

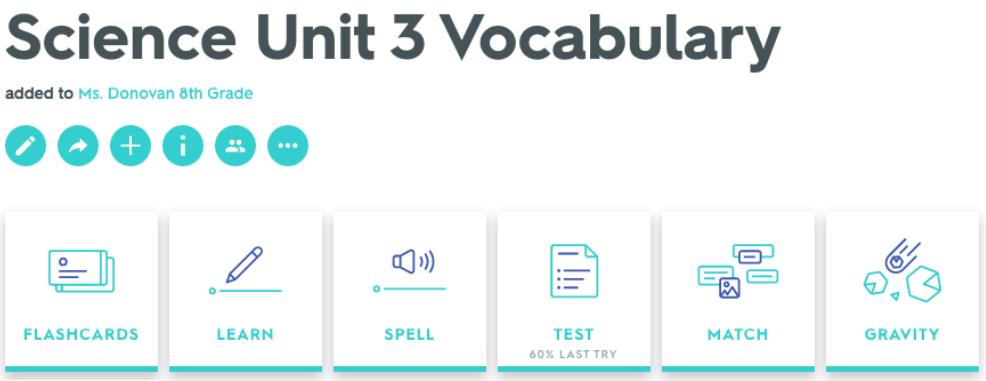

Figure 1. *Quizlet Dashboard*

Measurement Materials

Engagement observation checklist. An observation checklist was developed to monitor student engagement on the current task. The researcher recorded students as on or off task using an interval recording of one-minute for the first ten minutes of independent practice. Table 2 represents the on-task checklist used in the study.

Table 2.

Student Engagement Observation Checklist

Student	On-Task	Off-Task
A		
B		
C		
D		
E		
F		

Assignment. The students worked on Quizlet vocabulary games during the last ten minutes of class throughout the intervention period. A typical lesson in the class included a review of the science vocabulary taught the previous day, in addition to homework questions. The vocabulary words used were taken from the science textbook that corresponded to the lessons in that unit. An example quiz question asked students to define the word “solute”.

Survey. At the end of the study, the participating students completed a survey regarding their satisfaction with Quizlet learning video games. The survey used a Likert Scale format of 1-5 with 1 representing strongly disagree, 2 representing disagree, 3 representing undecided, 4 representing agree and 5 representing strongly agree. The questions inquired about the ease of website use, how well it helped students stay on task, if the application could be useful in other classrooms, and their enjoyment using the application (see Table 3).

Table 3

Student Satisfaction Survey

Vocabulary Games with Quizlet 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 Quizlet easy to use.					
2. The Quizlet application kept me on task.					
3. I would rather use technology to stay on task.					
4. The Quizlet application was a distraction.					
5. I would use the Quizlet application in other classes or settings to help me study.					
6. I enjoyed using the application in class.					
7. I am prepared for tests and quizzes after using Quizlet.					
8. I would like to share this technology with friends and other students.					

Research Design

The research was conducted using a single-subject design that followed an ABAB pattern. During Phase A, five baseline data points were collected for one week by the researcher using a student engagement observation checklist and teacher gradebook. During Phase B, intervention, students used the Quizlet application for three weeks to study science vocabulary. The students were provided with a teacher made Quizlet with the vocabulary terminology and definitions for the unit. The students were observed for the three weeks and then quizzed on vocabulary. Then Quizlet was removed for one week, during the second Phase A. The students were given new vocabulary words and quizzed without the use of a Quizlet. Lastly, during the second Phase B, students used the Quizlet application for three weeks to learn new vocabulary words. Three data points were recorded for each phase following the baseline data.

Procedures

Prior to the intervention, students were reminded how to access Quizlet vocabulary study sets through the resource room Google Classroom. Each student had previously created a Quizlet account, which was automatically linked to Google Classroom. The students were shown how to play various games offered on the dashboard. Any additional time during the block was given to students to play the learning video games.

Instructional design. The researcher observed and recorded students as on or off task using an interval recording of one-minute for the first ten minutes of independent practice during class time. A vibrating alarm on the researcher's iPhone was used to prompt the researcher to mark on-task behavior on a sheet. Additionally, the researcher

logged into Quizlet to review student completion of work and accuracy. Students had the opportunity to work at their own pace, however the quizzes were on a set date.

Measurement Procedures

Observations. During observations, the researcher watched the students from the side of the classroom at the teacher desktop. Every minute, a vibrating alarm from a timer application on an iPhone prompted the researcher to place a written response on the behavior checklist. During each interval a checkmark was used to track on-task behaviors.

Academic grades. All completed quizzes were recorded as data for the academic progress portion of the study. The teacher stored and accessed this information using the district's Genesis gradebook, as well as a traditional written gradebook.

Data Analysis

Student engagement was recorded in visual graphs representing each phase. The timing was converted into percentages of the period that students were on task. Academic grades were also compared in graphs according to percentages to provide a visual representation of student data at each phase. Means and standard deviations were displayed in table format (see Chapter 4). Student satisfaction survey scores were calculated in percentages. A comparison of scores between phases helped to determine if the video game Quizlet effected the acquisition of science vocabulary for students with learning disabilities.

Chapter 4

Findings

This study utilized a single subject ABAB design to evaluate the effects of the video learning game Quizlet on the vocabulary acquisition and engagement of students with learning disabilities. The study included six students with learning disabilities from an eighth grade resource room. The research questions to be answered were:

1. Will use of the video learning game Quizlet increase the science vocabulary acquisition of students with learning disabilities in a middle school resource classroom?
2. Will use of the video learning game Quizlet increase the on-task behavior/engagement of students with learning disabilities in a middle school resource classroom?
3. Are students satisfied with using the video learning game Quizlet?

Group Results

Figure 2 and Table 4 show vocabulary results for the six participants across each phase. Figure 2 shows the five vocabulary quiz scores collected prior to the intervention during the baseline phase. Figure 2 also shows the three vocabulary scores in each of phases following the baseline. Means and standard deviations of the student's vocabulary scores were calculated and are shown in Table 4.

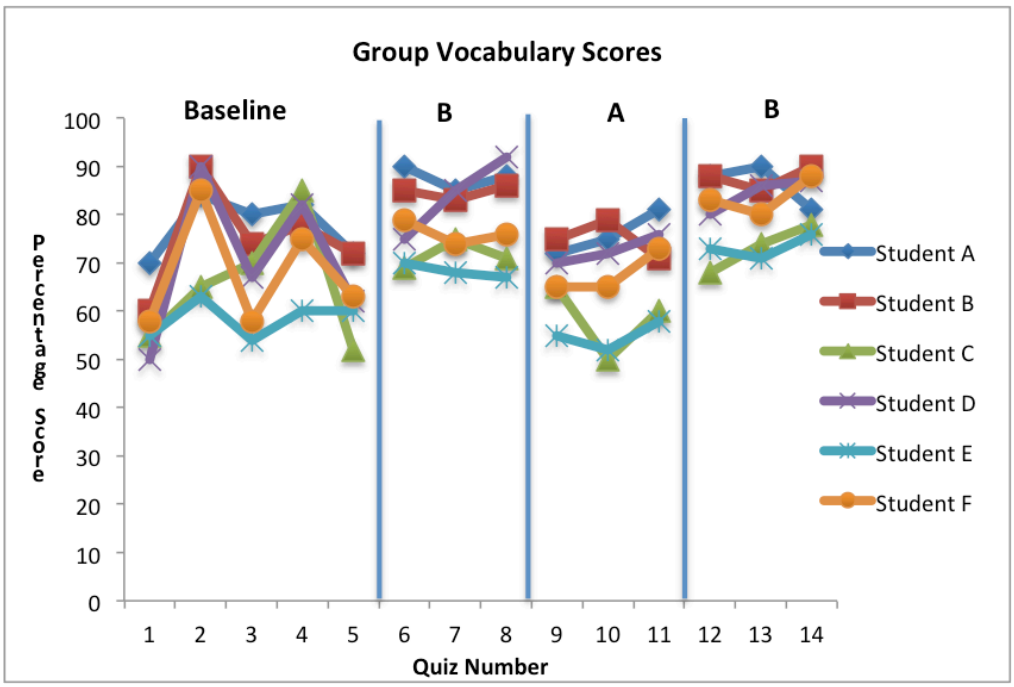

Figure 2. Group Vocabulary Scores

Table 4

Mean and Standard Deviation of Vocabulary Acquisition across Phases

	Baseline 1		Intervention 1		Baseline 2		Intervention 2	
	Mean %	SD %	Mean %	SD %	Mean %	SD %	Mean %	SD %
Student A	77.6	6.2	87.7	2.5	76.0	4.6	86.3	4.7
Student B	74.8	10.8	84.7	1.5	75.0	4.0	87.7	2.5
Student C	65.4	13.2	71.7	3.1	58.3	7.6	73.3	5.0
Student D	70.2	15.9	84.0	8.5	72.7	3.1	84.3	3.8
Student E	58.4	3.8	68.3	1.5	55.0	3.0	73.3	2.5
Student F	67.8	11.9	76.3	2.5	67.7	4.6	83.7	4.0

Table 5 shows the mean score for each individual student during the baseline and intervention phases. The overall group data showed a baseline mean of 68.4% for vocabulary. In the intervention phase B, the overall mean increased to 80.1%. All six participants increased their vocabulary scores. Lastly, Table 6 and Figure 3 show student weekly attendance across all phases.

Table 5

Science Vocabulary Quiz Means by Baseline and Intervention Phases

Student	**Baseline Mean (%)**	**Intervention Mean (%)**
A	77.0	87.0
B	74.9	86.2
C	62.8	72.5
D	71.1	84.2
E	57.1	70.8
F	67.8	80.0

Table 6

Weekly Attendance

Student	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
A	5	5	5	5	5	5	5	5	5
B	5	5	5	5	5	5	5	5	5
C	5	5	5	5	5	5	5	5	5
D	5	5	5	5	5	4	5	4	4
E	5	5	5	5	5	5	5	5	5
F	5	5	5	5	5	5	4	5	4

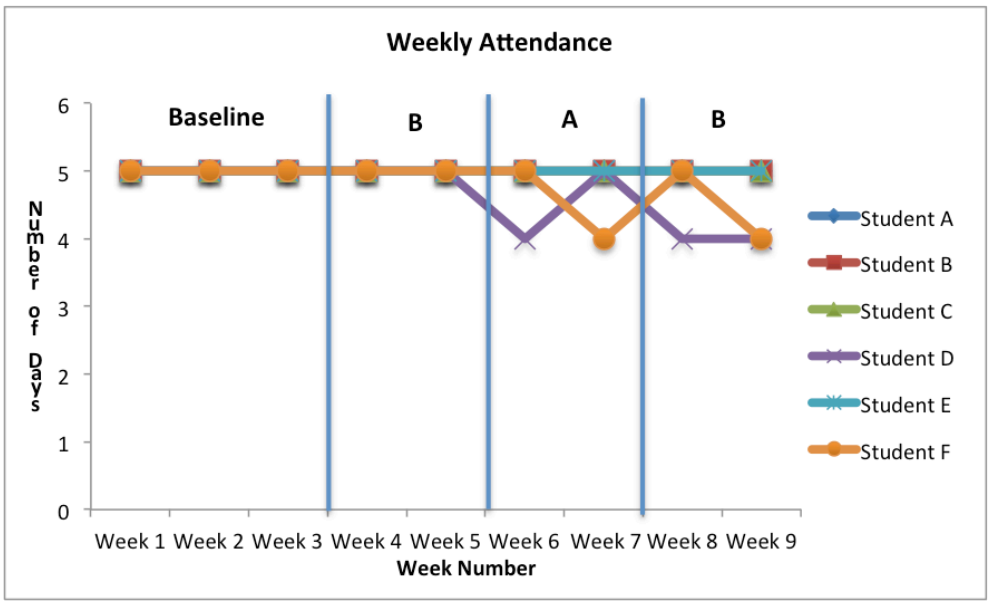

Figure 3. Weekly Attendance

Individual Results

Student A is a fourteen-year old White female who is eligible for services under the category OHI. Figure 4 illustrates the vocabulary scores for Student A across ABAB phases. The pre-intervention baseline science vocabulary mean score for Student A was 77.6%. During the first intervention, phase B, her weekly vocabulary quiz score increased to 87.7%. The weekly quiz score for the second baseline phase A decreased to 76.0%. The quiz score in the second intervention phase B increased to 86.3%. The mean science vocabulary score for Student A over the two phases of intervention was 87.0%.

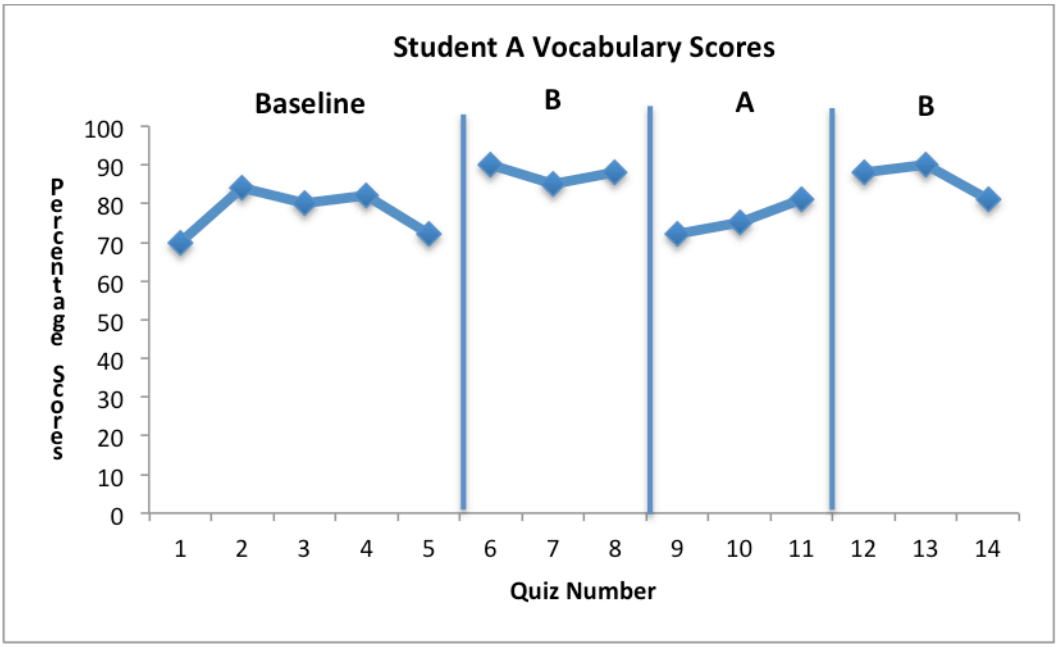

Figure 4. Student A. Vocabulary Scores

Student B is a thirteen-year old White female who is eligible for services under the category SLD. Figure 5 illustrates the vocabulary scores for participant Student B across ABAB phases. The pre-intervention baseline science vocabulary mean score for

Student B was 74.8%. During the first intervention, phase B, her weekly vocabulary quiz score increased to 84.7%. The weekly quiz score for the second baseline phase A decreased to 75.0%. The quiz score in the second intervention phase B increased to 87.7%. The mean science vocabulary score for Student B over the two phases of intervention was 86.2%.

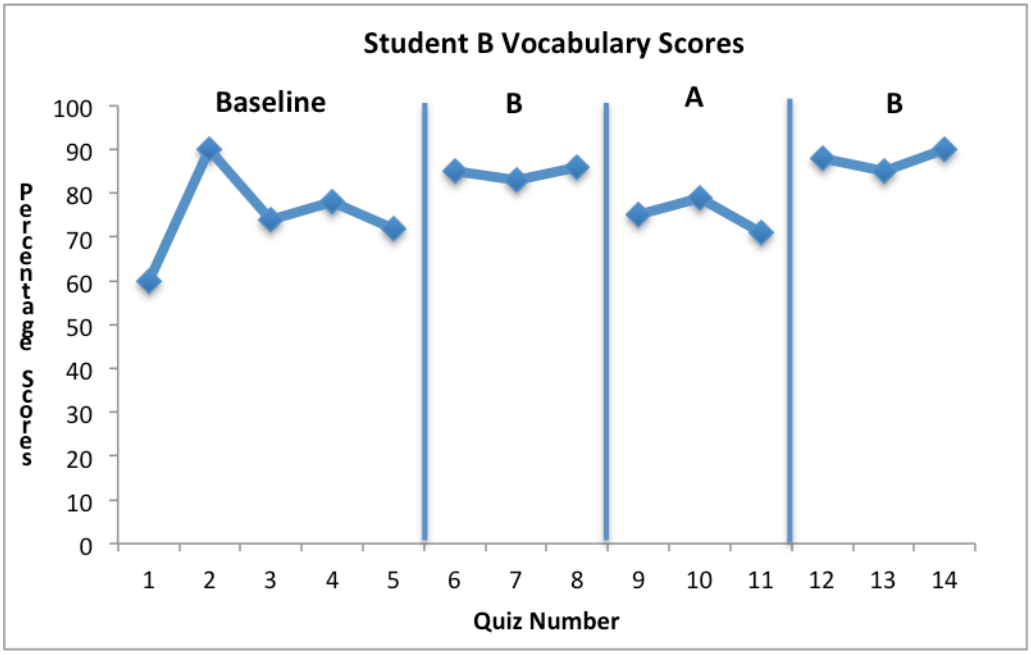

Figure 5. Student B. Vocabulary Scores

Student C is a fourteen-year old White female who is eligible for services under the category SLD. Figure 6 illustrates the vocabulary scores for participant Student C across ABAB phases. The pre-intervention baseline science vocabulary mean score for Student C was 65.4%. During the first intervention, phase B, her weekly vocabulary quiz score increased to 71.7%. The weekly quiz score for the second baseline phase A decreased to 58.3%. The quiz score in the second intervention phase B increased to

73.3%. The mean science vocabulary score for Student C over the two phases of intervention was 72.5%.

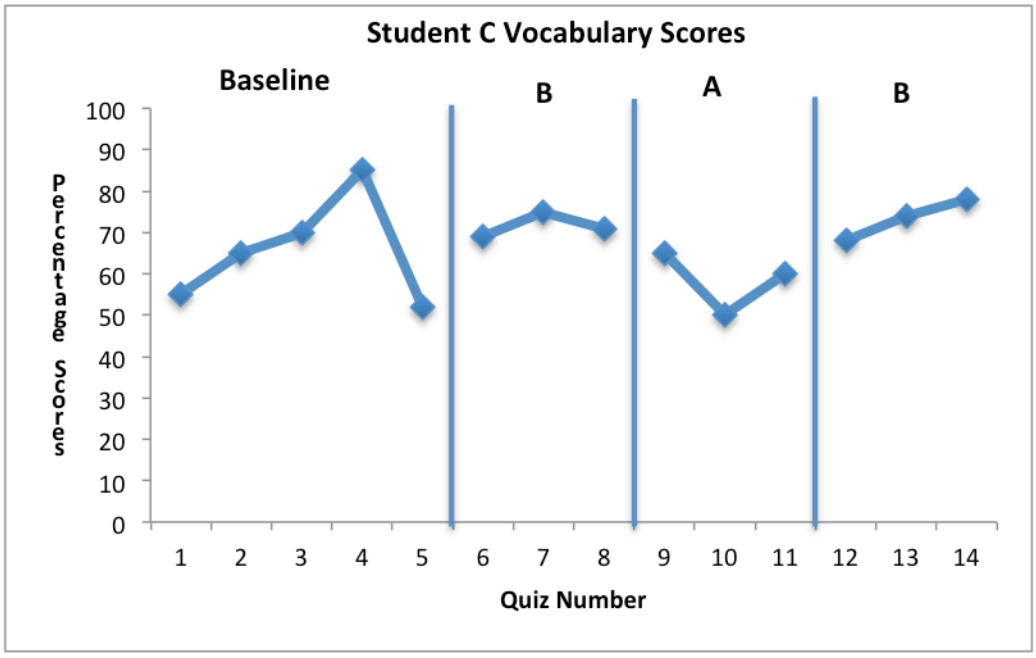

Figure 6. Student C. Vocabulary Scores

Student D is a fourteen-year old African-American male who is eligible for services under the category SLD. Figure 7 illustrates the vocabulary scores for participant Student C across ABAB phases. The pre-intervention baseline science vocabulary mean score for Student D was 70.2%. During the first intervention, phase B, his weekly vocabulary quiz score increased to 84.0%. The weekly quiz score for the second baseline phase A decreased to 72.7%. The quiz score in the second intervention phase B increased to 84.3%. The mean science vocabulary score for Student D over the two phases of intervention was 84.2%.

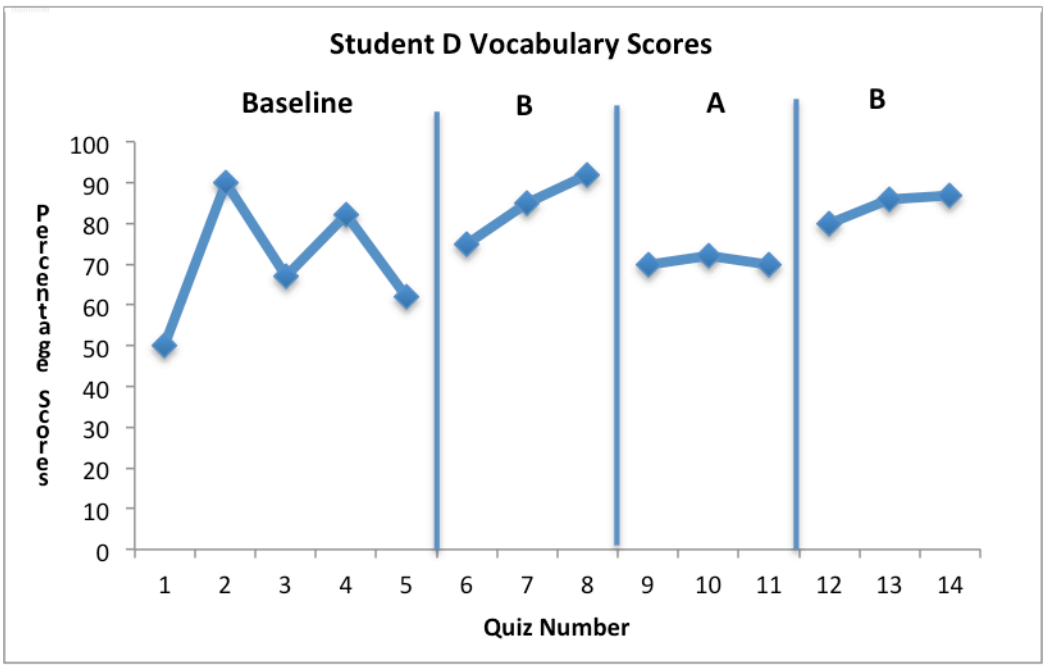

Figure 7. Student D. Vocabulary Scores

Student E is a fourteen-year old White male who is eligible for services under the category OHI. Figure 8 illustrates the vocabulary scores for participant Student E across ABAB phases. The pre-intervention baseline science vocabulary mean score for Student E was 58.4%. During the first intervention, phase B, his weekly vocabulary quiz score increased to 68.3%. The weekly quiz score for the second baseline phase A decreased to 55.0%. The quiz score in the second intervention phase B increased to 73.3%. The mean science vocabulary score for Student E over the two phases of intervention was 70.8%.

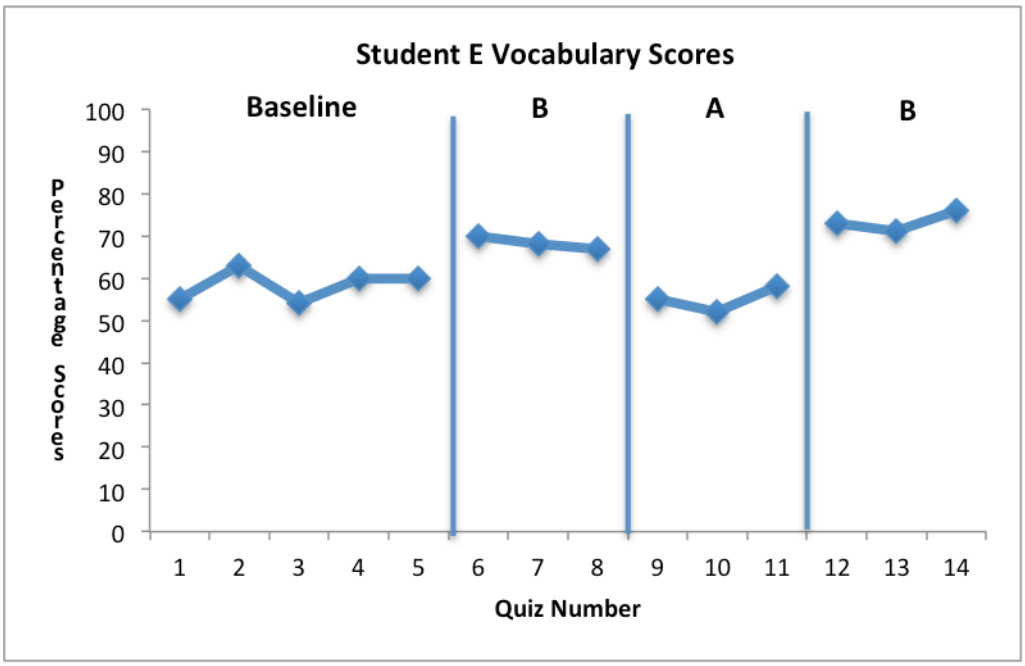

Figure 8. Student E. Vocabulary Scores

Student F is a thirteen-year old White male who is eligible for services under the category OHI. Figure 9 illustrates the vocabulary scores for participant Student F across ABAB phases. The pre-intervention baseline science vocabulary mean score for Student F was 67.8%. During the first intervention, phase B, his weekly vocabulary quiz score increased to 76.3%. The weekly quiz score for the second baseline phase A decreased to 67.7%. The quiz score in the second intervention phase B increased to 83.7%. The mean science vocabulary score for Student F over the two phases of intervention was 80.0%.

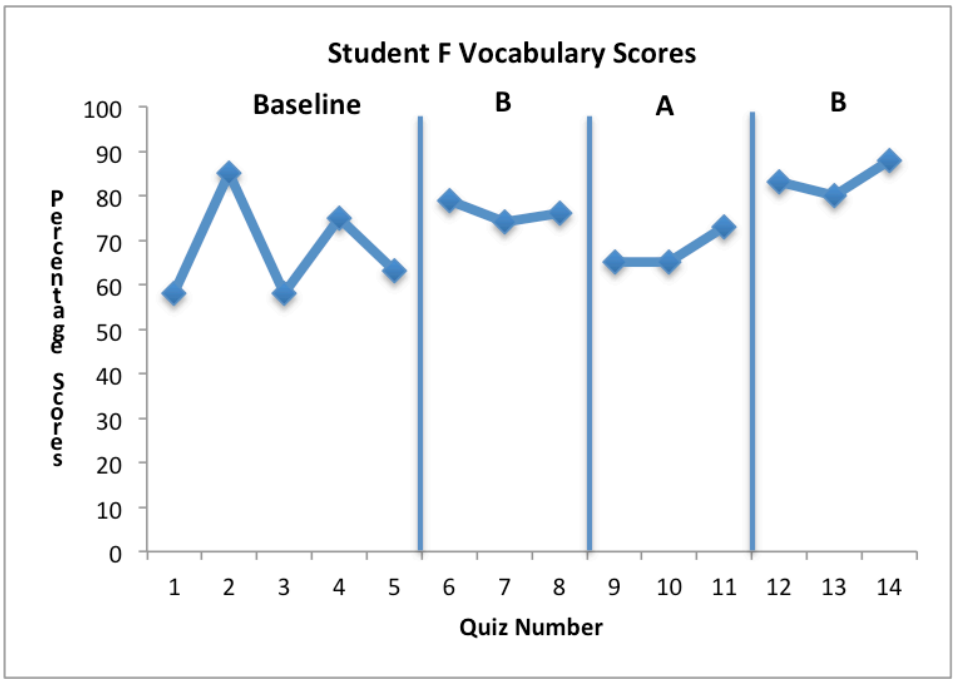

Figure 9. Student F. Vocabulary Scores

On-Task Behaviors

Student engagement was measured using the student engagement observation checklist. On and off task behaviors were observed and recorded using the observation checklist in Table 2. The researcher observed and recorded students as on or off task using an interval recording of one-minute for the first ten minutes of independent practice during class time. Means and standard deviations engagement behavior were calculated.

Work on-task. Figure 10 illustrates student engagement (time on task) scores for each of the six participants across ABAB phases. Student A displayed on-task behavior a mean of 7.7 times during the initial baseline, which increased to 9.5 during the first intervention. The mean score showed a decrease to 7.0 during the second baseline, followed by an increase to 9.5 in the second intervention. Student B displayed on-task behavior a mean of 8.7 times during the initial baseline, which increased to 10.0 during

the first intervention. The mean score showed a decrease to 7.5 during the second baseline, followed by an increase to 10.0 in the second intervention. Student C displayed on-task behavior a mean of 7.0 times during the initial baseline, which increased to 9.0 during the first intervention. The mean score showed a decrease to 6.5 during the second baseline, followed by an increase to 8.5 in the second intervention. Student D displayed on-task behavior a mean of 5.3 times during the initial baseline, which increased to 7.5 during the first intervention. The mean score showed a decrease to 4.5 during the second baseline, followed by an increase to 8.5 in the second intervention. Student E displayed on-task behavior a mean of 4.0 times during the initial baseline, which increased to 8.0 during the first intervention. The mean score showed a decrease to 5.0 during the second baseline, followed by an increase to 9.0 in the second intervention. Student F displayed on-task behavior a mean of 5.7 times during the initial baseline, which increased to 8.0 during the first intervention. The mean score showed a decrease to 5.0 during the second baseline, followed by an increase to 9.0 in the second intervention.

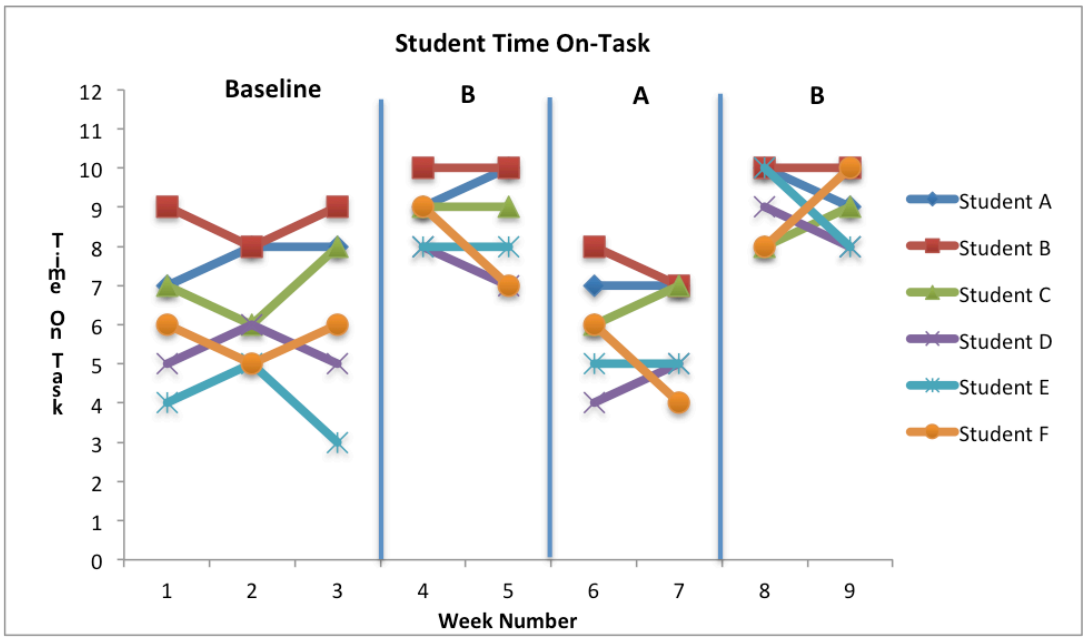

Figure 10. Students Time On-Task

Survey Results

At the end of the study, the students completed an anonymous Likert scale type survey. A choice of five responses were offered ranging from 1 to 5, with 5 representing "strongly agree," 4 "agree," 3 "undecided," 2 "disagree" and 1 "strongly disagree." No names were written on the survey to maintain student confidentiality. Percentages of student responses are presented in Table 7.

Table 7

Student Satisfaction Survey Scores in Percentages

	Statements	5 Strongly Agree (%)	4 Agree (%)	3 Undecided (%)	2 Disagree (%)	1 Strongly Disagree (%)
1.	I found Quizlet easy to use.	100	0	0	0	0
2.	The Quizlet application kept me on task.	66.6	33.3	0	0	0
3.	I would rather use technology to stay on task.	100	0	0	0	0
4.	The Quizlet application was a distraction.	0	0	0	16.6	83.3
5.	I would use the Quizlet application in other classes or settings to help me study.	50	50	0	0	0
6.	I enjoyed using the application in class.	100	0	0	0	0
7.	I am prepared for tests and quizzes after using Quizlet.	50	50	0	0	0
8.	I would like to share this technology with friends and other students.	66.6	33.3	0	0	0

All six students participated in the survey. All students strongly agreed that Quizlet was easy to use. Four students strongly agreed Quizlet helped keep them on task, while two students agreed with this statement. All students strongly agreed that they would rather use technology to stay on task. Five students strongly disagreed that Quizlet was a distraction, while one student disagreed with this statement. Three students strongly agreed and the other three students agreed that they would use Quizlet in their other classes or settings to help them study. All students strongly agreed with enjoying using Quizlet in class. Three students strongly agreed and the other three students agreed that they felt prepared for tests and quizzes after using Quizlet. Lastly, four students strongly agreed and two students agreed that they would like to share the Quizlet application with their friends and other students. Overall, the student satisfaction survey showed very positive results with the use of Quizlet.

Chapter 5

Discussion

The purpose of this study was to determine if using the video learning game Quizlet increases student science vocabulary acquisition, and student engagement in a middle school resource classroom, and to evaluate student satisfaction using the video learning game.

The results of the study showed that all students increased their science vocabulary acquisition between each baseline and intervention phase. The overall mean for the baseline phases for all six participants was 68.5% and the overall mean for the intervention phases was 80.1%. Student D had the greatest increase in his mean science score from the initial baseline to the first intervention. His baseline mean score was 70.2% and it increased to his intervention mean score of 84.0%, an increase of 13.8% after using Quizlet. Student E had the greatest increase in his mean science score from the second baseline to the last intervention. His baseline mean score was 55.0% and it increased to his intervention mean score of 75.3%, an increase of 18.3% after using Quizlet. One reason why Student D and Student E may have had the greatest mean science score increase from the baseline score to the intervention could be due to their frequency of practice. Both Student D and E were very intrinsically motivated by the use of the Chromebook and would be the first students to sign into Quizlet. These study results align with the findings of Gee (2003) in which the use of video games enhanced student academic performance. The findings of Granic, Lobel, and Engels (2014) in which video games can help improve cognitive abilities among students with learning disabilities also align with the present study's results. Furthermore, since the students

were able to connect the science vocabulary word with a picture through Quizlet the results corroborate with the findings of Cohen (2012), in which imagery allows students to connect words and their meaning, leading to greater retention of vocabulary.

Additionally, the results showed that all six students increased their engagement/time on-task behaviors while using Quizlet. Student E had the greatest increase in his mean time on-task from the initial baseline to the first intervention. His baseline mean was 4.0 which increased to his intervention mean of 8.0, an increase of 4.0 while using Quizlet. Student D, Student E, and Student F all equally had the greatest increase in their time on-task mean score from the second baseline to the last intervention, with an increase of a mean score of 4.0. These results corroborate with the findings of Annetta (2008), in which technology-based games generated a higher level of positive emotional engagement in students.

All students were surveyed after the intervention to find their opinions about using the video learning game Quizlet. The percentage of student responses was analyzed for each survey question in the five categories of strongly agree, agree, neutral, disagree, strongly disagree. All six participants strongly agreed that Quizlet was easy to use, they would rather use technology to stay on task, and they enjoyed using the application in class. Also, 100% of the students either strongly agreed or agreed with the statements, "The Quizlet application kept me on task", "I would use the Quizlet application in other classes or settings to help me study", " I am prepared for tests and quizzes after using Quizlet", and "I would like to share this technology with friends and other students." Lastly, 100% of the students either strongly disagreed or disagreed that Quizlet was a distraction.

Limitations

One limitation that may have impacted study results apparent in this study was time. This study was a master's thesis project conducted during a spring semester. A limited time frame between Rowan University's IRB approval and the end of the school year led to the study being conducted up until the last few weeks of the semester. As a result, each phase of the study was limited to two weeks. This limited the data collected, and the study may have yielded additional findings if each phase could have lasted several weeks. Because of the limited time for the study, the students only had five baseline vocabulary quizzes and three quizzes in each following phase. If more time had been used to collect data, the students' results may have differed.

Another limitation to this study was the time of day. Resource room took place during second block from 9:35-11:00 A.M. The six students had already been through one class and had the mindset that they are going to lunch after resource room. If the resource room was at the beginning or end of the day, there may have been different engagement/time on-task results.

Moreover, some of the students were also observed during a stressful time that coincided with their IEP reevaluations. These students were being pulled in and out of resource room in order for the testing to take place. The schedule changes may have affected student on-task behaviors and performance. Student C missed a significant amount of resource room for reevaluation testing, which could have resulted in his lower engagement scores. Bryant et al. (2003) and Nagy (1988) report students with learning disabilities require undivided attention and practice in order to retain new vocabulary.

This suggests it would have been better to expose the students to the intervention process during regular scheduling with no IEP reevaluation interruptions.

Lastly, a limitation inherent to single subject design is small sample size. This study was conducted with only six students. Data from this study may not be generalized beyond the six student participants, and additional research with a larger sample size is warranted.

Implications and Recommendations

Despite the limitations of this study, the data suggests that using the video learning game Quizlet with students with learning disabilities has a positive effect on science vocabulary acquisition, as well as student engagement. Prior studies have warranted similar results, however more studies with increased numbers of participants are warranted to further assess the effectiveness of Quizlet language science vocabulary acquisition of students with learning disabilities.

Conclusion

The results of this study were positive. Participants showed increases in both science vocabulary acquisition and engagement behaviors. It can be concluded that the use of the video learning game Quizlet had a positive impact on the academic achievement, as well as time on-task, of students with learning disabilities. While this study attempts to demonstrate the positive effects of Quizlet on the vocabulary acquisition of students with learning disabilities, further studies are recommended to be conducted with a larger number of participants, and over a greater period of time in order to strengthen research on this topic.

References

Annetta, L. A. (2008). Video Games in Education: Why they should be used and how they are being used. *Theory Into Practice, 47*(3), 229-239. doi:10.1080/00405840802153940

Archambault, I., Janosz, M., Morizot, J., & Pagani, L. (2009). Adolescent behavioral, affective, and cognitive engagement in school: Relationship to dropout. *Journal of school health, 79*(9), 408-415.

Bryant, D., Goodwin, M., Bryant, B. R., & Higgins, K. (2003). Vocabulary instruction for students with learning disabilities: A review of the research. *Learning Disability Quarterly, 26*(2), 117.

Cohen, M. T. (2012). The importance of vocabulary for science learning. *Kappa Delta Pi Record, 48*(2), 72-77.

Dieker, L. l., Finnegan, L., Grillo, K., & Garland, D. (2013). Special education in the science classroom. *Science Scope, 37*(4), 18-22.

Dreyer, J. (2014). The effect of computer-based self-access learning on weekly vocabulary test scores. *Studies in Self-Access Learning Journal*, 5(3), 217-234.

Edyburn, D. L. (2000). Assistive technology and students with mild disabilities. *Focus On Exceptional Children*, *32*(9), 1.

Edyburn, D.L. (2006). Assistive technology and mild disabilities. *Special Education Technology Practice*, 8(4), 18-28.

Foil, C.R., & Alber, S.R. (2002). Fun and effective ways to build your students vocabulary. *Intervention in School and Clinic, 37*(3), 131-139.

Forgrave, K. E. (2002). Assistive technology: Empowering students with learning disabilities. *The Clearing House, 75*(3), 122-126.

Gee, J. P. (2003). From video games, learning about learning. *Chronicle of Higher Education, 49*(41), B13-B13.

Granic, I., Lobel, A., & Engels, R. C. M. E. (2014). The benefits of playing video games. *American Psychologist, 69*(1), 66-78. doi:10.1037/a0034857.

Jitendra, A. K., Edwards, L. L., & Sacks, G. (2004). What research says about vocabulary instruction for students with learning disabilities. *Exceptional Children, 70*(3), 299-322.

Lewis, R. B. (1998). Assistive technology and learning disabilities: Today's realities and tomorrow's promises. *Journal of Learning Disabilities, 31*(1), 16-26.

Lim, Y. P., Lim, P. S., & Lazim, A. M. (2012). Video games in education. *Computer Games, Multimedia and Allied Technology (CGAT 2012)*, 73-76.

Marino, M. T. (2010). Defining a technology research agenda for elementary and secondary students with learning and other high-incidence disabilities in inclusive science classrooms. *Journal of Special Education Technology, 25*(1), 1-28.

Marino, M. T., & Beecher, C. C. (2010). Conceptualizing RTI in 21st century secondary science classrooms: Video games' potential to provide tiered support and progress monitoring for students with learning disabilities. *Learning Disability Quarterly,* 33(4), 299-311.

Marino, M. T., Basham, J. D., & Beecher, C. C. (2011). Using video games as an alternative science assessment for students with disabilities and at-risk learners. *Science Scope, 34*(5), 36-40.

Marino, M., Israel, M., Beecher, C., & Basham, J. (2013). Students' and teachers' perceptions of using video games to enhance science instruction. *Journal of Science Education & Technology, 22*(5), 667–680. doi:10.1007/s10956-012-9421-9

Nagy, W. (1988). Teaching vocabulary to improve reading comprehension. Newark, DE: International Reading Association.

New Jersey Department of Education (2014). Performance Reports. (n.d.). Retrieved January 30, 2017, from http://www.nj.gov/education/pr/1314/35/353320070.pdf.

Park, S. s. b. e., Holloway, S. s. h. b. e., Arendtsz, A., Bempechat, J. j. w. e., & Li, J. J. L. B. e. (2012). What makes students engaged in learning? A time-use study of within- and between-individual predictors of emotional engagement in low performing high schools. *Journal of Youth & Adolescence*, 41(3), 390-401. doi:10.1007/s10964-011-9738-3

Seifert, K., & Espin, C. (2012). Improving Reading of Science Text for Secondary Students With Learning Disabilities: Effects of Text Reading, Vocabulary Learning, and Combined Approaches to Instruction. *Learning Disability Quarterly*, 35(4), 236-247.

Siegle, D. d. (2015). Technology. *Gifted Child Today, 38*(3), 192-197.

Vaidya, S. R. (1999). Metacognitive learning strategies for students with learning disabilities. *Education,* 120(1), 186.

Woodfine, B.P., Babtista Nunez, M., & Wright, D.J. (2006). Text-based synchronous e-learning and dyslexia: Not necessarily the perfect match! *Computers and Education, 50*, 703-717.

Young, E. (2005). The language of science, the language of students: Bridging the gap with engaged learning vocabulary strategies. *Science Activities, 42*(2), 12-17. doi:10.3200/SATS.42.2.12-17.