7-15-2019

Investigating the Use of Web-Based Vocabulary Acquisition Programs as a Tool to Strengthen Vocabulary Skills for 11th and 12th-Grade Students

Deborah Ashraf
Nova Southeastern University, da29@mynsu.nova.edu

Investigating the Use of Web-Based Vocabulary Acquisition Programs as a Tool to Strengthen Vocabulary Skills for 11th and 12th-Grade Students

by
Deborah R. Ashraf

An Applied Dissertation Submitted to the
Abraham S. Fischler College of Education and School of Criminal Justice
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

Nova Southeastern University
2019

Approval Page

This applied dissertation was submitted by Deborah R. Ashraf under the direction of the persons listed below. It was submitted to the Abraham S. Fischler College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Steven Hecht, PhD
Committee Chair

Susanne Flannelly, PhD
Committee Member

Kimberly Durham, PsyD
Dean

Statement of Original Work

I declare the following:

I have read the Code of Student Conduct and Academic Responsibility as described in the *Student Handbook* of Nova Southeastern University. This applied dissertation represents my original work, except where I have acknowledged the ideas, words, or material of other authors.

Where another author's ideas have been presented in this applied dissertation, I have acknowledged the author's ideas by citing them in the required style.

Where another author's words have been presented in this applied dissertation, I have acknowledged the author's words by using appropriate quotation devices and citations in the required style.

I have obtained permission from the author or publisher— by the required guidelines—to include any copyrighted material (e.g., tables, figures, survey instruments, large portions of text) in this applied dissertation manuscript.

Deborah R. Ashraf
Name

July 5, 2019
Date

Acknowledgments

First, I want to thank my family and in particular my husband, Mohammad Ashraf. Thank you for your encouragement and love. For putting up with all the complaints, late nights, early mornings, and weekends. Thank you for supplying the tissues when I cried or was stuck, encouraging me to continue during the months, weeks, days, and hours, I spent working on my dissertation. I could not have done it without your love, strength, and understanding.

I want to thank my classmates Annaliese Hightower. & Ruth Jayson-Polk. We worked hard, complained to each other, and had each other's back, and for being my mentors, friends, and having tons of patience. I could have not of had better friends in this journey!

I want to thank the faculty at Ft. White High School for the love and encouragement and in particular Dixie Donovan, my friend, teacher colleague. I know I drove you crazy when it came to anything dealing with math. Your advice and wisdom helped me throughout my classes and all of my math meltdowns and crisis.

I want to thank my parents, Chester and the late Elizabeth Allen. I love you both! My Dad, who taught me to work hard for something you want and do right in this world. To my Mom, who taught me never to stop learning something new every single day, and to always look up at the stars and believe! You taught me that God is always watching over me and guiding me on this journey.

Finally, I want to thank Dr. Hecht, who spent countless hours teaching, discussing, and tutoring not just myself, but many students who are lucky enough to have him as their chair. I was blessed with good luck to have him as my chair. No words could ever thank him enough for all of his guidance, patience, encouragement, and advice.

Abstract

Investigating the Use of Web-Based Vocabulary Acquisition Programs as a Tool to Strengthen Vocabulary Skills for 11th and 12th-Grade Students. Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. Keywords: Achieve3000, automaticity in reading, Freerice, Lexile score, operant conditioning, reading comprehension, teacher-directed instruction, vocabulary acquisition, vocabulary-in-context, vocabulary-out-of-context, vocabulary retention, web-based instruction, word-level reading.

This study focused on the need to improve vocabulary and increase reading comprehension for remedial high school students in 11th and 12th grades. Methods or interventions included in-context, out-of-context vocabulary acquisition using web-based tools (Achieve3000 & Freerice) or teacher-directed instruction. The study used the three methods of treatment or intervention to determine which treatment group was most effective in improving vocabulary and increasing reading comprehension.

There are several different theoretical frameworks used in this study. Vocabulary in-context and out of context theories included Schema theory, self-teaching hypothesis theory, and the Matthew effect theory. These theories had in common an emphasis on the cognitive processing of reading-related information. Instructivism theory or approach is often called direct instruction. It is traditional teacher-directed, with the transfer of knowledge from teacher to student.

The study used a quantitative approach to determine the impact of web-based vocabulary acquisition tools versus teacher-directed instruction on vocabulary and reading comprehension skills of 11th and 12th-grade remedial high school students.

Participants included 11th and 12th-grade students who were enrolled in Research and Critical Thinking (remedial) classes at a Florida, high school. The results of this study showed very little statistical differences between the groups. However, the out-of-context groups, both Freerice and teacher-directed instruction, showed gains. The researcher believes teaching vocabulary out-of-context show merit, and the approach could prove to be beneficial to remedial high school students in the 11th and12th-grades.

Table of Contents

Page

Chapter 1: Introduction 1
- Introduction 1
- Statement of the Problem 1
- Researcher's Role 14
- Purpose of the Study 14
- Definition of Terms 14

Chapter 2: Literature Review 19
- Importance of Vocabulary 20
- Achieve 3000-Vocabulary in Context 27
- Freerice.com-Vocabulary Out of Context 30
- Vocabulary in Context With Reading Comprehension 32
- Using Technology to Teach Vocabulary 33
- Teacher Directed Instruction 37
- Theoretical Framework 41
- Theories of Vocabulary Acquisition in Context 42
- Vocabulary Acquisition Without Context 46
- Research Questions 50

Chapter 3: Methodology 51
- Introduction 51
- Participants 51
- Instruments 52
- Procedures 54

Chapter 4: Results 60
- Introduction 60
- Demographic Characteristics 60
- Preliminary Findings 61
- Primary Findings 64
- Conclusion 69

Chapter 5: Discussion 71
- Introduction 71
- Summary of Findings 71
- Interpretation of Findings 73
- Context of Findings 75
- Implications of Findings 76
- Limitations of the Study 80
- Future Research Directions 82

References 84

Appendices

A Vocabulary Assessment-Resources 110
B Freerice Vocabulary List 114
C Student Example of Freerice 116
D Vocabulary Assessment & Answer Key 118
E Frayer Model 123
F Student Samples 125
G Gates MacGinitie Reading Comprehension Test (GMRT) and Sample Assessment Question 128
H Letter of Agreement for Using Gates-MacGinitie Reading Test (GMRT) in Study 130

Tables

1 Depiction of the Implemented Pre- and Posttest Control Group Design 57
2 Sample Demographics 61
3 Achieve 3000, Vocabulary Test (CBVT), Gates-MacGinitie Reading Test (GMRT), Segregated by Group 65
4 Pairwise Comparisons of Posttest Means Among the Three Groups While Controlling for Pre-tested Performance 68

Chapter 1: Introduction

Introduction

How does one motivate, teach vocabulary, and improve reading comprehension to juniors and seniors in a remedial class in high school? According to Allen (2000), vocabulary instruction must be meaningful for the student for learning and retention. Many of the students that were assigned to remedial classes had failed the state assessments in reading, scoring either a level one or level two. The remedial reading classes were defined as Research 3 (Grade 11) and Critical thinking (Grade 12). The Florida State Assessment (FSA) reading portion contained six to eight passages with vocabulary and comprehension questions. The passages consisted of informational (non-narrative) and literary text. According to Yopp and Yopp (2006), the informational text contains unknown or unfamiliar words, but the past emphasis has been on teaching the literary text. To increase the students' abilities or eliminate deficits in vocabulary, several web-based vocabulary tools, along with traditional methods of instruction, were used in the study to investigate vocabulary acquisition.

Statement of the Problem

Students in the 11th and 12th grades have limited vocabulary and are unmotivated to read.

The topic. The topic of this proposed dissertation was to investigate the usage of web-based vocabulary acquisition programs as a tool to strengthen vocabulary skills for 11th and 12th-grade students.

The research problem. A large number of 11th and 12th-grade students lack vocabulary knowledge. This has a direct impact on reading comprehension and motivation to read. According to Chall and Jacobs (2003), reading materials, word

recognition, and vocabulary become more difficult as the student's grade level progresses. Chall and Jacobs stated that to understand the material the reader, "must be fluent in recognizing words, and their vocabulary and knowledge need to expand, as does their ability to think critically and broadly" (p. 14).

The lack of vocabulary knowledge impacts the reading comprehension of students who are trying to keep up with core content classes. These students are required to read grade-level textbooks. This requirement, when coupled with below-reading grade level vocabulary development, which slows fluency, creates a growing lack of motivation to read. According to Sprick (2013), when students do not understand what is going on in the class, motivation and behavior become a key factor in the student's learning ability. Placing the struggling reading student in a classroom with 15 to 25 other students with the same attitude can become a teacher's nightmare. Students will act out or do anything at all to draw attention away from their inability to read well. Lockavitch (n.d.) stated that critical facts gathered from vocabulary research has shown that the poorest readers have the weakest vocabulary. Lack of vocabulary impacts reading comprehension and vocabulary learning that should take place when there are varied opportunities to read.

Roberts, Torgersen, Boardman, and Scammacca (2008), noted that the five essential areas for effective reading instruction for the older students should include: word study, fluency, vocabulary, comprehension, and motivation. Hasbrouck and Tindal (1992) stated that students need to be able to read automatically between 100 to 150 words per minute at middle school levels in be fluent. According to Perfetti (1985), when students know the vocabulary words, they read fluently, thinking about what they are reading. When a student does not know the vocabulary, they must stop to think about

what they are reading. The student has to work twice as hard to keep up with the class. Sometimes the student will forget what they are reading or will not understand the topic, and this affects the student's reading comprehension. According to Roberts et al. (2008), students that are already behind must then do double the amount of work to show average yearly growth. How does vocabulary instruction help the struggling reader? In a study conducted by Braze, Tabor, Shankweiler, and Menci (2007), results show that word knowledge and vocabulary development have a direct link to reading comprehension. As a result of the study, it is suggested that targeted vocabulary development would help the older reader.

Vocabulary development is one of the key components of reading literacy (Sedita, 2005). Other components include phonemic awareness, phonics, word study, fluency, and comprehension. Students may fall behind in reading acquisition for several reasons. According to Sedita, these may include problems with the English language as experienced by English language learners, inadequate or nonexistent reading outside of school, reading and learning disabilities, and students with insufficient vocabulary knowledge. The traditional method of teaching vocabulary, known as drill and kill included: giving students a list of spelling words, requiring them to look up the definition, and finally, using the word in a sentence. The student would study for the week and typically take the test on Friday. The teacher would then repeat the process each week with a new list of spelling or vocabulary words. Some core teachers give students a study guide, and students work either alone or in pairs filling in their guides. Activities might include looking up new, content area, vocabulary words. That is one strategy that teachers may use to pre-teach the vocabulary for a particular unit.

There were several ways to approach the challenge of teaching vocabulary and motivating the 11th and 12th-grade students. According to Allen (2000), not enough time in high school is set aside for independent reading. Research has found that independent reading and improvement of vocabulary skills are closely linked. The more a student reads, the more vocabulary they are exposed to in the text. One method of strategically teaching vocabulary is through direct instruction. Direct vocabulary instruction is an effective strategy for many reasons:

- Direct vocabulary instruction increases reading comprehension.
- Students gain knowledge of new concepts.
- Process writing improved.
- Communication becomes more effective.
- Students develop an understanding of new words.

How does one motivate secondary students to learn vocabulary? According to Eren (2015), using web-based vocabulary programs as tools for supplementing vocabulary learning; increases student motivation, and encourages ownership of their learning. Notable web-based vocabulary programs included Achieve3000 (n.d.), and Freerice.com (n.d.). Achieve3000 is a reading comprehension program that teaches vocabulary in context. Freerice.com (n.d.), is a free vocabulary online game that teaches vocabulary out of context while donating rice to world hunger for each correct word. Teacher-guided direct instruction of vocabulary skills focused on using targeted strategies, strategic sequencing of instruction, pacing, monitoring of progress, review, and reinforcement of skills. Direct instruction activities included word webs, graphic

organizers, vocabulary board games, word walls, word of the day, vocabulary notebooks, prefix/suffix races, etc.

Background and justification. Students who read below grade level, have difficulties reading the classroom textbooks and materials in the content or core subject areas. The students may fall behind in the class and not be able to understand the concepts being taught, take part in discussions, fill out a study guide, or take notes. When this occurs, Mayer (2002) stated that students will not have retention of the material or construct meaningful learning from the lesson. According to Sedita (2005), readers cannot understand what they are reading if they do not know what the words mean. Today's 11th and 12th-grade students have grown up with technology, using it to answer questions and do homework. According to Drouin and Davis (2009), students frequently use abbreviations in texting, staying away from the higher-level vocabulary. The students' do not use higher level vocabulary in their daily lives while interacting with peers on digital media, or cell phones. Many students are not accustomed to writing in complete sentences. The students no longer use books for research but instead use a web browser. Students can simply type in a word or subject, and up pops the needed information.

According to Gallagher (2003), reading is dying out as part of the curriculum in many high schools. Many students experience very little exposure to independent reading or reading for extended periods in the classroom. Other factors contributing to the lack of reading time includes poverty, second language learners, teaching to the test, no time set aside in the class or curriculum for reading. Joshi (2005) stated:

> Poor readers tend to read easier materials and fewer books than do good readers; consequently, poor readers' vocabularies grow at a slower pace. Students with robust vocabularies, on the other hand, read more, comprehend better, and just read more still improving their vocabularies. (p. 213).

So, if the student is already struggling, the student will continue to fall further behind in vocabulary and reading for each grade level.

All students take the Florida State Assessment (FSA) in Grade 10 as mandated by the State of Florida each year. Many schools and district grades depend on students scoring appropriate levels of test scores on state assessments. Buenger, Butler, and Urrutia (2010) stated students with lower reading levels tend to score lower on the assessments. The assessment passages increase not only in length but in difficulty with each grade level. It has become an issue for many school districts who rely on state funds. The results dictate monitoring of lower level readers and teaching of needed skills such as text complexity, informational text, writing, and reading comprehension. Many teachers are under pressure to not only show student growth but increase the school grades. According to Popham (2001), in such situations where a teacher teaches to the test, not curriculum, does the higher test score reflect student growth, or is it simply teaching to the test? According to Gardner (1993), when this occurs, it is teaching certain skills and strategies to pass a test. It hinders different ways, techniques, methods, and subject matter that the students learn in a classroom. In a study by Reardon, Valentino, and Shores (2012), using various assessments, only one-third of students in middle school possessed the necessary reading comprehension skills. As students got older, 10% of U.S. 17-year-old students read at the level of nine-year-olds.

Due to the changes to Florida State laws passed in 2015, there are no longer remedial reading classes at the secondary level. To help the students prepare for the state assessments and requirements for graduation, classes were created called Research 3 for Grade 11 and Critical Thinking for Grade 12. The classes are reading intervention courses. Students do not want the stigma of being in a remedial classroom, especially a junior or senior in high school. Students are trying to keep up with core content courses and read complex grade-level textbooks, which are above the students' reading level.

When a student does not understand what is going on in class, motivation and behavior might become a factor in the student's learning. Peer pressure, social forces are a big issue in a high school class. Students do not want to be goody-goodies, so they may act up in the class or fail on purpose. Students are automatically placed in a Research 3 or Critical Thinking course upon receiving a Level One or Two on the Florida State Assessment (FSA). Juniors and seniors take the FSA test twice a year. According to the State of Florida (2017), students are required to pass the state assessment to graduate from high school. Students continue in the Research 3 or Critical Thinking class until achieving a passing score of 350 on the FSA. In the proposed dissertation, the average student age in the 11th and 12th-grade was 17 to 19 years old. The basic goals of the critical thinking and research classes are to motivate the students, increase vocabulary, increase reading comprehension, and increase reading levels; therefore, increasing the chances of passing the state assessments. The other alternative to passing the state assessment requirement would be to obtain a concordant score on the ACT/SAT college assessments. Students may substitute a passing score of a 19 on the reading portion of the

ACT, or a passing score of 430 on reading portion of the SAT. (The passing score on the SAT was raised in October 2018 to 480 for entering ninth grade students). The students were not prepared to take a college-level assessment due to low reading comprehension and lack of vocabulary abilities. Passages on the assessments include informational text such as Humanities, Science, History, Arts, Literature, and Narrative text.

Boardman et al. (2008) stated that "Older students who are tackling complex informational text face serious and growing challenges." (p. 1). According to Boardman et al. (2008), older students' reading instruction should include five areas:

- Word study.
- Vocabulary.
- Comprehension.
- Fluency.
- Motivation.

Hirsch (2003) described three principles to help with reading comprehension. One of the three principles included building vocabulary to increase comprehension and fluency. Nagy and Scott (2000) agreed that students' comprehension depended on knowing 90 percent of the words. Those that do not know 90 percent fall further behind. Stanovich (1986) stated, "Children with inadequate vocabularies-who read slowly, and without enjoyment-read less, and as a result have slower development of vocabulary knowledge, which inhibits further growth in reading ability." (p381). It is called the "Matthew Effect." Where the rich get richer, and the poor get poorer. In reading, the good reader continues to grow. The student who is a poor reader becomes so far behind; it is impossible to catch up. Much of the research that has been conducted on struggling

readers centers on the third and fourth grades; it is often referred to as the 'Fourth Grade Slump.' According to Chall et al. (1990), low-income students by grade seven are more than two years behind their grade reading levels. In follow-up research, those same students in Grade 12 were well below their former seventh-grade reading levels. The students fell further behind and did not maintain the seventh-grade reading levels. This helps reinforce the idea of the "Matthew Effect."

Does the way vocabulary is taught make a difference in vocabulary acquisition for the high school student? According to Dalton and Grisham (2011), using web-based tools increases students' interaction with vocabulary, interest, motivation, and increases incidental vocabulary acquisition. The Achieve3000 is a purchased program bought by the Columbia County School District specifically for the Research and Critical Thinking classes. Due to district budget, there are a limited number of spaces for level one and two reading students. When students are assigned to the class, they are required to take a pre-test or an assessment. It determines their reading Lexile levels on Achieve3000 (n.d.) program. The Lexile shows the students' reading ability and level. According to the Achieve3000 program, the focus is on vocabulary in context and nonfiction passages. Students are monitored by the program. It increases their vocabulary/reading levels as the student progresses. Students are required to score a 75% or higher on the reading passages. Students are assigned two passages per week and must complete the required five steps in each lesson. The program supplies a report each week. The report shows the state assessment standards and the skills that are correct and those that need work. Each passage has vocabulary in-context that goes along with the passages. Achieve3000 passages include Florida State Assessment (FSA) challenge passages which align with

the state assessment. The program helps prepare the student for the type of questions, and vocabulary they would experience on the assessment.

Freerice.com is a free web-based online vocabulary game. It can be expanded to other subject areas as well but is used mainly for vocabulary acquisition. It was created and donated to the United Nations. There are social aspects and motivation to the game site. When students play, for each correct word, ten grains of rice are donated to the World Food Program managed by the United Nations. The game is set up so students may compete against other schools, classes, individual friends or themselves. According to Reynolds (2014), students playing online games are motivated, involved, and more likely to stay on task. They have incidental vocabulary acquisition and retention of the vocabulary. The control group consisted of teacher directed vocabulary instruction and strategies.

Deficiencies in the evidence. The majority of vocabulary acquisition studies are conducted at elementary school grade levels (Butler et al., 2010). According to Fuchs, Fuchs, and, Compton (2010), few research studies are conducted at the secondary level for several reasons. These include scheduling issues, maturation of students, monitoring of students through testing scores, not screenings, and limited time remaining for interventions at the 11th and 12th-grade levels. Existing studies of vocabulary instruction/acquisition have not been conducted in a remedial high school class but at elementary or middle levels. According to the 2015 National Assessment of Educational Progress (NAEP), 37 percent of 12th-grade students read at or above grade level, with the vast majority performing below basic levels. The results showed a decline in reading abilities for 12th-grade since 1992. There is a lack of consensus concerning which

instructional approaches work best for teaching vocabulary to high school struggling readers.

Vocabulary was not included in the district's reading assessment, identification, and intervention. According to the district where the study took place, a comprehensive research-based reading program was in place for the school year 2017-18 ("K-12 Comprehensive Research-Based Reading Plans," 2017 & Columbia County High School (9-12) Reading Plans (2017-18). The same plans were renewed for the 2018-19 school year. However, upon review of identifying reading skills for intervention, vocabulary was not listed. Nor was it listed or identified upon review of earlier reading interventions for Grade 9 or Grade 10. According to CPalms (2013), the State of Florida's official source for standards and course descriptions, reading is not listed at the secondary level.

The 11th and 12th-grade remedial reading students were placed in classes with course descriptions: Research 3 and Critical Thinking. Given the key importance of vocabulary for reading comprehension skills acquisition (National Reading Panel, 2000); inclusion of research-based vocabulary interventions for high school students is an important issue to be addressed by the district. ("K-12 Comprehensive Research-Based Reading Plans," 2017, and renewed for the 2018-19 school year). This district's gap in practice reflects the general state of the research literature; that is, there is a paucity of reading research that focuses on the best practices for remediating secondary students vocabulary skills using technology (Musu-Gillette et al., 2017; Malmgren et al., 2009; Manzo et al., 2006). The course descriptions do not list vocabulary in the interventions or description. The study was to help fill this important gap in the research literature by

determining the utility of using web-based vocabulary instruction (in-context and out-of-context) for high school students.

Audience. By investigating the usage of web-based vocabulary acquisition, the administration and district leaders can review and possibly identify programs that might increase the vocabulary of level one and two readers. This, in turn, might increase the overall achievement of a passing score on the state assessments and SAT/ACT college assessments in the future. Students, faculty, administration, district leaders, and English/Reading departments at the secondary school level, and district would benefit if a correlation was indeed found or be affected by the topic of the dissertation. Nova Southeastern University students majoring in Education and Instructional Technology/Distance Education might benefit from the discussion.

Setting of the Study. The high school was located in Northern Florida. It was one of two high schools located within the district. Located in a small rural town with a population of 563, and one signal light at the main intersection of town. The school served as a feeder school for many of the small communities in the district and had an enrollment of 1170 students. The school contained Grades 6-12. The makeup of the student body changes from year to year due to migrant and transient population. The school qualified as a Title 1 school, although not classified as one, the entire student body received free breakfast and lunch. The school had over 80 percent of the student body riding school buses. According to Simon (2010), many Title 1 schools have a large population of minority, poor, and students with disabilities, Hispanic, and English learners.

It was a full inclusion school with several self-contained classrooms, two at the high school level and one at the middle school level. The school had a Health Academy which offered students opportunities of acquiring a CNA certificate after passing the appropriate nationally recognized examination. The Business Academy offered students an opportunity to become Microsoft Certified. Students may earn a certificate in Culinary Arts as well. There was an Agriculture Academy along with an Applied Engineering Technology that upon completion, students may earn an industry certification.

The classes were on a seven-period schedule with each class seen every day. Each period was 50 minutes (including one planning period per day) with five minutes between each class. There were 76 full-time teachers with various degrees. The ethnic breakdown of the high school included 79 percent white, and 21 percent minority. The minority breakdown included Asian 0.4%, American Indian or Alaskan Native 0.3%, African American 10%, Hawaiian Native or Pacific Islander 0.1%, Hispanic 6%, and two or more races 4%.

The school had several computer labs for testing, end-of-course examinations, and a Virtual or Edgenuity Lab. Edgenuity is an online provider of courses in Grades K-12. The program offers credit recovery, intervention, and test preparation. Many of the students did not have Wi-Fi or internet access, and it became necessary for the school to supply a computer lab for these students. The state of Florida requires students to complete one online course as a graduation requirement.

Students who initially failed the Grade 10 Florida State Assessment (FSA, scoring a Level one or two), were placed in a Research 3 class. If a student does not pass the FSA retakes and continues to Grade 12, they are placed in a Critical Thinking class. Students

taking the FSA assessment are required to read four 900 to 1500-word passages, with both fiction and nonfiction topics. Students must be able to answer questions about the passages. The Research and Critical Thinking class was a large room equipped with a Chromebook cart, 26 desks, and a supply of fiction and nonfiction books.

Researcher's Role

The researcher's role in the organization was that of the remedial reading teacher. This role included creating a safe, respectful environment, collect and review data of previous FSA results, checking for Individual Educational Plans and 504's, developing lesson plans that were based on student needs in reading. Strategies, monitoring of student progress in class, motivating students, lesson plans including FSA, ACT, and SAT reviews were part of the class curriculum. The researcher has been at the same school and district and teaching intensive reading for 14 years. Previous experiences were at the elementary level. The researcher has been a teacher for 20 years.

Purpose of the Study

The purpose of this applied dissertation was to investigate the relative efficacy of two web-based vocabulary acquisition programs to strengthen vocabulary skills for 11th and 12th-grade students.

Definition of Terms

Terms and definitions as used in the study.

Achieve3000. Achieve3000 (n.d.) is an online differentiated instruction program using nonfiction, science and social studies content passages and academic in-context vocabulary. It is grade-level, standards-aligned instruction in Tiers 2 and 3 vocabulary.

Intervention may be conducted in a regular classroom or intensive intervention in a specialized classroom. (Achieve3000 n.d.)

Automaticity in Reading. According to Rasinski et al. (2005), automaticity in reading is being able to read a word or identify a word or many words accurately as a unit without thinking. The ability to read words and sentences accurately and automatically leads to reading fluently.

Reading fluency. Hasbrouck and Glaser (2012) defined reading fluency as reading accurately, at a reasonable rate, with expression that leads to comprehension. Reading fluency is the ability to decode and comprehend at the same time. Fluency leads to improved reading comprehension. Reading is a thinking process.

Freerice. Freerice is an online database program with varying levels of vocabulary (60 levels). It is a multiple-choice, out of context vocabulary program. It gives immediate feedback and repeats incorrect words. Students advance to the next level upon completing a level with 100 percent accuracy. If the student has a large number of incorrect words, it will lower the level of vocabulary.

Lexile score. The Lexile score is a measuring instrument of reading ability. The higher the Lexile, the higher the reading ability. It is in 5 intervals with 5L as a beginning reader and 2000L at the highest level. Students in Grade 10 should be at 1080L or above. Students in Grade 11 through Grade 12 should be 1185-1385L with 1440L at the beginning college level, according to the Lexile Framework for Reading-College Readiness Scale (2018).

Operant Conditioning. Operant Conditioning is the behavior or consequences of good or bad behavior could be used as conditioning in learning. In the elementary

classroom, bad behavior might include time out; good behavior might include stars for good work. There are rewards or punishment for secondary or high school level for learning behavior. Changes can be made by either increasing or decreasing a certain behavior through reward or punishment.

Reading comprehension. Reading comprehension is making sense or meaning from words we read, its form, word structure, or how it is used in a sentence (Birsh, 2011).

Teacher-directed instruction. Teacher-directed instruction occurs when the teacher directs or guides instruction through explicit, guided, or sequenced lesson plans with specific skills to be taught. Students are placed in groups and instructed at their skill levels. The teacher-directed instruction allows the teacher to reteach, accelerate the lessons according to the mastery of the lesson. (Carnie, Silbert, Kame'enui, and Tarver 2010).

Vocabulary acquisition. Vocabulary acquisition is knowing how to say a word, knowing the definition and how it is used not only by itself but in a relationship with other words is vocabulary knowledge (Stahl, 2005). It is the acquisition or the process of learning new words.

Vocabulary in-context. Vocabulary in context, is the reader's ability to figure out the unknown vocabulary words by reading around it, using the sentences and words that surround it, to figure out the meaning of the word (Nagy, Herman, and Anderson, 1987). It may also be referred to as a contextualized vocabulary.

Vocabulary out of context. Vocabulary out of context is explained as when a vocabulary word is isolated, and the reader must use multiple-choice to figure out the

meaning of the word. The reader is not given any information that could be used to infer the meaning of the word (Schatz and Baldwin, 1986). According to Butler and Roediger (2008) when measured using multiple-choice, the reader could select the correct answer by process of elimination. Even so, there is no information that can be used to infer the meaning of the given word.

Vocabulary retention. Vocabulary retention is the ability to remember or retrieve from memory new words that were learned over a period of time (Min 2008).

Web-based instruction. Web-based instruction is instruction delivered using the Web for the purpose of teaching and learning (Relan and Gillani, 1997). In this study, it is using the Web to facilitate vocabulary learning

Word level reading. According to Hock et al. (2009), the word level reader uses several different phonological recoding skills, including word attacks where individual sounds-letters are used to sound out or decode an unknown word. Phonological recoding skills are usually tested through nonsense words. The word level reader uses other skills as well, such as instant word recognition from long term memory (called lexical access).

Chapter 2: Literature Review

Introduction

The literature review addresses the need for vocabulary instruction at the high school level, using various web-based tools in instruction. Being able to access the vocabulary in a web-based format helps to motivate learning, unlike the traditional method of vocabulary acquisition. It provides a basic knowledge of computers in preparation for computer-based state assessments. According to Hasselbring and Goin (2004), there have been decades of research about the usage of computers and programs for teaching reading. Students in high school find themselves in remedial reading classes for varied reasons. Furthermore Anderson and Nagy (1993), reason it might be because of test anxiety, but mostly, it is due to a lack of vocabulary. Anderson and Nagy (1993) consider that the lack of vocabulary knowledge/acquisition is the rationale of why, high school students are failing the state assessments, reading below grade level, and falling behind in core classes. Using data from progress monitoring and state assessments, Petscher, Kershaw, Koon, and Foorman (2014) stated that with the data, "...it might be possible to identify a set of students who began the school year at a similarly low level or reading" (p. 1**).** Identifying students who are low level readers can be done through performance tests, which are conducted to help predict how a student will do on a state assessment. Identification of the struggling reader is important so that the lower level reading student can be monitored, and instruction for needed skills/strategies are used in the remedial class to help the student increase vocabulary and reading comprehension.

There are many different viewpoints, strategies and methods of teaching vocabulary acquisition. Nagy and Anderson (1984) specified that there are more

vocabulary words than a teacher can cover in the classroom. When developing lesson plans, the teacher must take into account the students in the classroom. According to Gardner (1993), every student learns differently, has different background knowledge, different levels of vocabulary knowledge, and one type of vocabulary instruction will not affect real all students. A teacher needs to adjust teaching techniques and lessons to accommodate all different types of learners. Nassaji (2003) acknowledged that different strategies are needed for the various types of learners, including English Language Learners (ELL), and remedial readers to aid their needs in learning vocabulary. How can I as a teacher actually teach vocabulary to high school students? Through my experience as a reading teacher by finding and incorporating web-based tools and strategies that will help improve high school students' vocabulary and reading abilities.

Importance of Vocabulary

Davis and Bauman (2013) used census records to estimate the number of high school students was between 15.7 million in 2000 to 17.5 million in 2005. Back in 2003, Joftus and Maddox-Dolan estimated that about 6 million secondary students were reading below grade level and that about 3,000 students drop out of high school per day. Rutenber (2009) found that in the last 15 years, over 15 million students graduated from high school reading below basic level, and 70 percent of high school students needed remediation in reading. Teachers and school districts are under pressure to show student growth by students receiving passing scores on state assessments. State assessment scores determine benefits for the district, school, and teachers. According to No Child Left Behind (NCLB 2001), state assessments are based on grade level reading material. For a student to be considered successful, a student must make Adequate Yearly Progress

(AYP), this is according to the State of Florida Department of Education (2005d). Students with lower reading skills tend to score lower on state assessments. (Buenger, Butler, and Urrutia,, 2010).

State assessments contain a majority of nonfiction reading passages with comprehension skill questions. The passages increase in length and difficulty with each grade level. Secondary age student with persistent reading difficulties falls behind each year as the level and complexity of the reading passages increases. Tilstra et al. (2009), stated that reading comprehension decreases as students age into secondary grade levels with skills such as decoding words decreasing after fourth grade. Instruction of decoding and phonemic awareness cease after fourth grade unless the student is placed in reading intervention classes or tested for reading deficiencies.

According to Reardon et al. (2012), using various assessments, only one-third of the students in middle school possessed the necessary reading comprehension skills. As students got older, ten percent of United States 17-year-old students read at the level of nine-year-olds. Jeffes (2016), expressed that reading interventions focus on children in primary grades, not secondary grades. When the student has difficulty with word recognition, they lose the ability to understand or comprehend the meaning of the sentence or passage. The complexity of the core textbooks increase with each grade level and secondary students are required to read grade-level textbooks. Therefore, the student cannot comprehend or understand the text and falls behind the class.

According to the National Center for Education Statistics (2013), 64 percent of eighth graders are reading below grade level, and 65 percent of the fourth graders are reading below grade levels. Fast forward to 2015, and the National Assessment of

Educational Progress (NAEP) stated that only 37 percent of high school seniors scored on or above reading level. The 8th graders from the 2013 National Center for Education Statistics (2013) were seniors in 2017 and the 4th graders from the research became 10th graders in 2019. According to the Mathew Effect, these students would not have increased in reading abilities. The results showed a decline in reading abilities for seniors since 1992. The NAEP is sometimes referred to as the Nation's Report Card on Math and Reading scores in the United States.

The results from the National Assessment Educational Progress (2017) data showed a slight increase in 8th grade reading but not the other grade levels including 12th grade. Martin (2018) reviewed the scores from the NAEP report for a decade and half. The gap between the low and high level students have widened according to his investigation. The trend of 2015 has continued according to Martin to show a decline in high school reading scores. The 2017 Nations Report Card reported that 37 percent of the United States 12th graders are reading at or above grade level. Florida's 12th graders were reported to be at 36 percent at or above grade level.

According to Hock et al. (2009), "more than eight million adolescents have not mastered the reading skills necessary for them to successfully respond to demanding secondary school requirements or compete for meaningful jobs in the workplace" (p.21). Salinger (2011) stated that high school students are not prepared for entrance into higher institutions of study such as community or state colleges and will need remedial classes in reading or math at the college level. According to Salinger, after graduation many students face reading of applications, entry-level reading and or work-related training. Clemens et al. (2017) stated that students continue to struggle with reading because they

lack reading skills such as vocabulary and fluency. The lack of basic skills continued through adolescence. Due to the lack of the basic skills according to Clemens et al., students cannot read or understand text and fall short in College Board entrance exams such as ACT or SAT. This hampers the opportunities of attending higher-education institutions.

In a longitudinal study conducted by Hernandez (2011), "One in six children who are not reading proficiently in third grade, do not graduate from high school on time, a rate four times greater than that for proficient readers" (p.3). He continued by stating, "The rates are highest for the low, below-basic readers: 23 percent of these children drop out or fail to finish high school on time, compared to 9 percent of children with basic reading skills and 4 percent of proficient readers" (p.3). According to findings and reading proficiency statistics in a study conducted by the Annie E. Casey Foundation (2010), over 68 percent of 4th-grade students in public schools in the United States scored below level or proficient level in reading. According to the National Assessment of Education Progress (2010

Pikulski and Templeton (2004), stipulated that students need to learn an average of 3,000 words per year to stay on grade level. Students are reading at level one and two, will not be able to keep up with the content area required in many high schools. It not only affects the student's ability in reading on the high school level but the ability in the future to comprehend the subject matter and topics being taught at the college level with the increased amount of reading required for each course. According to Cambria and Guthrie (2013) by middle school struggling readers begin to doubt their reading abilities,

give up trying or place a limitation on their ability to learn new reading strategies and skills.

Dryer and Nel (2003) indicated that low-level readers are unprepared for the reading levels, demands in the higher-grade levels of education, and continue to use ineffective strategies for learning vocabulary. As grade levels increase, so does the amount and levels of the complicity of writing, informational, nonfiction, or textbook reading. Textbooks have various features, including text boxes, subject-based vocabulary, and concepts. Budiansky (2001) explained students that are already having difficulty concentrating, to begin with, might be distracted by the fancy subtitles, sidebars, and other items in the textbook. Technical reading can affect a student's comprehension. Secondary struggling readers run into problems with the amount of reading and complexity of the text as they advance through grade levels. According to studies conducted by Wexler, et al. (2008), Grades 6 through 12, students are moving from reading narrative text to more expository text.

Pikulski and Templeton (2004) noted a student's general and reading achievement is based on vocabulary knowledge. According to Harmon and Wood (2018), vocabulary instruction's main purpose is to support reading comprehension and that it was especially important in the secondary content area classrooms. A study conducted by Durkin in 1979 in which 36 classrooms were studied and observed during reading instruction, very little vocabulary instruction was observed. The vocabulary instruction observed included pre-teaching vocabulary to aid comprehension of the passage or text. Rupley and Nichols (2006) stated if the student has limited reading vocabulary, they cannot identify concepts, make inferences, and will lack adequate reading comprehension

to understand the text. Harmon, Hendrick, and Fox (2000) affirmed that textbooks do not differentiate or take into account each students' reading level. The textbook is generalized for the designated grade level. It makes it especially difficult for students reading on a lower-level, and students with learning disabilities. According to Harmon et al., (2000), many textbook assignments call for students to write or answer questions about the chapter or subject. Students will not learn a great deal from textbooks if the student cannot read them!

Harmon, Hendrick, and Wood (2005) conducted studies not only in content analysis but also teaching vocabulary skills to help in concept and content knowledge. They found that vocabulary acquisition skills were able to increase the student's understanding by developing their word knowledge, building background knowledge, and thereby increasing the content knowledge from the text. However, struggling readers tend to focus their attention on trying to read each word and lose the connections between the idea in the text or building background knowledge. Zugel (2009) stated that if the student can't read the word, understand what it means; they will have difficulty comprehending the idea or concepts in the text. According to Ouellette (2006), reading involves vocabulary, word recognition, and decoding, phonological, and semantic growth. If reading skills and abilities are therefore based upon these facts, increasing vocabulary knowledge and acquisition of new vocabulary is essential to the student. Beck and McKeown (1991) stated that students need to learn new words or vocabulary to support reading comprehension. Therefore, reading strategies, word-learning skills, and modeling of vocabulary are important in content area classes.

The textbooks for content area classes vary in different types of text according to the subject. For example, in a social studies textbook, there are specific concepts and generalizations. Students must be able to use skills such as drawing inferences, read about cultures, economies, and subjects in which the student has no background knowledge. According to Vacca and Vacca (2002), the students in a social studies class must be able to read the expository text. If a student lacks vocabulary and is already a struggling reader, the class will be challenging since there are facts, summarizing, taking notes, chronological order, cause/effect, technical vocabulary, and other concepts to understand along with taking in consideration of the grade level of reading in the textbook. Ilter (2017), stated that students need to learn strategies such as context clues and vocabulary due to the content-area and higher-thinking textbooks.

It is not just reading of print but vocabulary exposure at home that affects a child's reading abilities. Hart and Risley (1995), specified that vocabulary exposure in the home influenced the children's vocabulary abilities in school. Children from disadvantaged homes learned and spoke fewer words than those from advantaged homes, who learned two or three times as many as their counterparts. According to Biemiller (2005), English-speaking children lacking vocabulary knowledge knew about 4000-word meanings, the average level of vocabulary children knew about 6,000, and the highest group knew 8000 words. Biemiller stated, "...words that are not heard or read cannot be learned" (p.3). Landauer, McNamara, Dennis, and Kintsch (2007) reported that a child's vocabulary is affected by the end of second grade due to limitations in disadvantaged households. According to Rowe, Raudenbush, and Goldin-Meadow (2012), vocabulary problems begin early. Young children with small vocabulary knowledge have

comprehension difficulties, and due to the difficulty comprehending the words, in turn, read less. They continue to fall further behind their classmates.

Bromley (2004) indicated that there are many different factors that might affect students' vocabulary learning. Lack of background knowledge due to native language and culture, socio-economic levels, and the method of instruction. Biemiller (2005) determined in many studies, English-learners are on average, two years behind in vocabulary knowledge. In another study by Biemiller (2010), many of the students who are having difficulty with vocabulary are misdiagnosed with reading disabilities, when it is simply a lack of vocabulary knowledge. Nassaji (2003) noted that different strategies are needed for the various types of learners and their needs in learning vocabulary.

According to Nelson (2008), traditional methods of instruction for middle and high school in the past have included flashcards, rote memorization, looking up definitions, context clues strategies, and the weekly traditional vocabulary lists with a memory-based vocabulary quiz given to the whole class to measure vocabulary acquisition. Younger children have been tested one-on-one, and as the child advances, weekly vocabulary tests, and finally, standardized assessments have been used to show growth in vocabulary and reading comprehension for the various grade levels.

How do I as a teacher gauge student gains and instructional methods besides the usage of standardized assessments? Stahl and Bravo (2010) explained that teachers need a quick and evidenced-based method of teaching vocabulary and monitoring of student gains. Wells and Lewis (2006), reported in 2005, in the United States, almost 94 percent of instructional classrooms had internet access. While the student-to-computer ratio was at four students to one laptop in 2005 in the classroom, usage of hand-held devices has

increased. According to the National Center for Educational Statistics also known as the NCES (2017), stated that students who have access to computers and internet at home score higher in reading. However, those students who do not have access to internet outside of the school benefit from having access in the classroom. The site of the study qualifies for a Title 1 school and is divided into middle and high school. Many of the students do not have internet access at home. According to Technology Resources Inventory (2018), there are a total of 789 Chromebooks with 272 desktop computers for the combined schools. This would be a breakdown of three students to one Chromebook. However, on the high school side where the study took place, there are 94 classrooms with wireless or physical Ethernet connections. There are 250 Chromebooks (25 per Chromebook cart), and 250 desktop connections in the computer labs with 650 students in grades 9-12. This gives the ratio of 2.6 students to 1 computer in the classroom on the high school side. Hand-held devices such as cell-phones, IPad, etc. allow teachers and students mobility in learning. For teachers, this can mean taking attendance, sharing presentations, notifications to students, quick class surveys (similar to clickers), etc. Students have the ability to access and send assignments, projects, ask questions, without having to wait for school or class periods to turn in the work. However, there are challenges and concerns with technology usage in the classroom, such as student attention and focus during the class, social media diverting attention, cheating on assignments, etc.

Rubin (2008) noted that students are spending more of their leisure time with technology or social media. It has led to challenges in the development of curriculum in the area of literacy and reading. Implications or issues for the teacher include getting the

students' attention, interest, and focus in the classroom. With all these distractions, how does one teach struggling juniors and seniors' vocabulary and reading comprehension? There are several ways to approach the challenge. According to Eren (2015), using web-based vocabulary programs as tools for supplementing vocabulary learning, and increasing reading comprehension, gives students ownership of their learning. In addition Dalton and Grisham (2011), reported using web-based vocabulary tools increases students' interaction with vocabulary, interest, and increases incidental vocabulary acquisition.

Achieve3000-Vocabulary in Context

Reading-based computer programs, according to Nomass (2013), are used to improve vocabulary, fluency, and reading comprehension. The programs may be used by teachers to help remedial students, English Language Learners (ELL), and to increase comprehension, vocabulary, and fluency. According to a study conducted by Lipka and Siegel (2012), lack of reading comprehension skills is evident in English Language Learners and especially critical for the secondary ELL students. The study was conducted with 30 different schools and ELL students. The students came from various backgrounds, with more than four different languages. Students were tested using three different word exams and reading comprehension tests. The assessments helped to determine the student's various levels of reading and comprehension skills. The findings of the study suggested teaching reading comprehension skills such as vocabulary, and decoding would benefit the reading comprehension in ELL students. Tozcu and Coady (2004) studied the effects of direct vocabulary instruction using computer-based text instead of traditional teacher-directed vocabulary instruction. The three areas used for

case study analysis included: vocabulary knowledge, reading comprehension, and fluency. According to Tozcu and Coady's results suggested that the learners' who used the computer-based text program scored higher in all three areas. Marulis and Neuman (2013) conducted a meta-analysis study and reported that passages combined with explicit vocabulary instruction embedded in the text, contained multiple opportunities for the learner to see the vocabulary multiple times. At risk-students showed significant gains in vocabulary acquisition and reading comprehension. In purchased programs, according to Yborra and Green (2003), the programs usually contain reading passages or text that the learner might otherwise wouldn't read such as historical, science topics, and current events. Butler-Pascoe and Wiburg (2003), affirmed that concordance software examines lexical, syntactic, and semantic patterns using reading passages. In other words, students read authentic passages with the vocabulary in context.

The Achieve3000 program was purchased by the district specifically for the Research, and Critical Thinking classes (remedial reading classes) and has a limited number of spaces for students. It is a supplemental nonfiction program for ages 3 through adult. Students take a semi-adaptive assessment that provides teachers with Lexile scores. When students are assigned to the class, they take a pre-test/assessment that determines their reading levels or Lexile. The Lexile shows exactly the students' reading ability and level. In a study conducted by Rash, Johnson and Gleadow (1984), learners at Kindergarten levels were able to learn, and retain short term memory of target words in fewer tries when the target word was used in a sentence. According to the Achieve3000 program, the focus is on vocabulary in context and nonfiction passages (reading comprehension). By using vocabulary in context, the program is using active reasoning

with textual clues, and prior knowledge of the words surrounding the unknown words to help the student develop vocabulary acquisition. The Achieve3000 pages include Florida State Assessment (FSA) challenge passages which align with the state assessment. The program helps students with the types of questions and vocabulary they might experience on the assessment. In a study conducted by Goerss, Beck, and McKeown (1999), instructional intervention using vocabulary in context proved effective in word meaning acquisition for struggling readers.

According to Koren (1999), the practice of providing definitions of target words along with the reading passage, "enables quicker and more convenient access to the meanings, as well as other visual and interactive advantages for the learners" (p.6). The definitions provide support for the reader, and it enables them to automatically draw, and make connections to their background information. Nash and Snowling (2006) conducted an intervention study using two groups of students. One group was taught vocabulary words using definitions, and the second group was taught vocabulary in context. Pre and post-tests were given to both groups, and another test was administered three months later. The group that was taught using vocabulary in context recalled more vocabulary knowledge and had better comprehension skills. Horst, Cobb, and Nicolae (2005) explained that using reading passages with integrated quizzes helps reinforce retention of the featured vocabulary words and reading comprehension. Nelson (1998) stated activities or strategies such as multiple-choice questions at the end of the reading passages, along with automatic scoring, helped with both the vocabulary acquisition and comprehension for the learner.

Biemiller and Boote (2006) contended that vocabulary knowledge retention of the word meaning increases if the words are used in context. According to Nagy and Scott (2000), using context clues or inferring the meaning of a word can be done by looking at the lines before, the sentence containing the word and sentence after the word. The context clues strategy is important to the growth of vocabulary due to the amount of text the student encounters through the course of school. According to Fedora (2014), struggling reading students rely heavily on context clues strategies to try and figure out the word. The good reader automatically recognizes the word. When the student can recognize the word automatically, they become a fluent reader. Having the word appear in context, within a passage, helps the student make a connection to the word, thus providing real-world connection and meaning to the word.

Freerice.com-Vocabulary Out of Context

According to Conrad and Deacon (2016), many students use visual or orthographic knowledge with word recognition when reading. The student looks at the word, calls upon their individual background knowledge of the sounds, word parts, structures, or syllables. The student who has difficulty reading may lack the ability or background knowledge to recognize the word.

Freerice is a free web-based online vocabulary game. It can be expanded to other subject areas but is used mainly for vocabulary acquisition. It is vocabulary out of context. This means that only the word is presented or stands by itself. There are no sentences surrounding the unknown word to aid or help the student determine the meaning; unlike Achieve3000 (in-context) which has the unknown word in the passage surround by sentences. The student may use context clues to determine the word

meaning. Carter (1992) asserted that vocabulary should be taught separately, not part of reading. Freerice requires the student to choose the correct one-word definition from multiple-choice answers. It will repeat incorrect answers. If a student incorrectly answers two or more level words, the system will revert to one lower level allowing the student to scaffold and build back up to that level. Instruction materials are free and can be downloaded. Printable materials include posters, certificates, and writing lessons. According to Freerice (n.d.), the definitions come from dictionaries, thesauruses, and synonyms. There are 60 levels in the vocabulary section with over 12,000 words. Kapp (2012) noted that students' usage of educational mini digital games that teach vocabulary, benefit from repetition, instant assessment, and are motivated/rewarded by points or rewards. Wouters and van Oostendorp (2013) conducted a meta-analysis study involving educational video games and results showed positive effects on the retention of material, in this case, vocabulary.

In a study conducted by Martin-Chang, Levy, and O'Neil (2007), students who learned vocabulary words out of context mastered or remembered more words compared to the in context students. The in-context students read faster but could not recall as many of the word meanings as the out of context students. When combined both out of context and in context, there was no difference in the two groups. In an empirically study conducted by Martí-Parreño, Méndez-Ibáñez, and Aldás-Manzano (2018), considered the first study of its kind, an educational video game (EVG) was tested against paper and pencil, and video clips that taught English language vocabulary. Results for English Speakers of Other Languages (ESOL) students showed more improvement in vocabulary acquisition in the educational video game group over the other two treatments. Martí-

Parreño et al. expressed that educational video games not only motivate but can give immediate feedback, scaffold, and differentiate instruction for each learner. They suggested that continued future research in the area of educational video games (EVG), namely vocabulary acquisition was needed due to the limitation or convenience sample of the target population (ESOL) students.

Vocabulary in Context With Reading Comprehension

Comprehension is understanding what you read about the topic or subject. The reader uses skills such as word recognition, fluency, and phonics or phonemic awareness. According to Pressley (2000), comprehension begins with basic skills, which include decoding, vocabulary or word knowledge and active involvement from the reader. Petress (2008) stated that active learning or involvement is not dependent on the teacher but on the learner becoming engaged in using strategies. Students who have problems reading may also have difficulty with word recognition or decoding. The student has to stop and try to decode the word, figure its meaning out, and then try to read the sentence. In this case, to figure out the vocabulary word, the reader constructs a mental model of the meaning conveyed by the words. The reader uses strategies such as predicting and the world or prior knowledge. This the connection between vocabulary and reader comprehension. The student might have to do this all day and not understand what they are reading.

Samuels and Flor (1997) asserted that automaticity was important to the reader. When the reader has automaticity with vocabulary, it frees up the mind for higher order thinking allowing the reader to gain more details of the reading passage or sentence, which leads to improved reading comprehension. According to Tighe, Wagner, and

Schatschneider (2015), the overall goal in reading is comprehension. It is complex involving higher and lower thinking skills such as decoding, vocabulary knowledge, memory, and comprehension. According to Dalton and Grisham (2011), vocabulary is a major key to understanding and comprehension. As students continue through grade levels, classroom textbooks become more challenging. Floyd, Keith, and Meisinger (2012) contended that a student's cognitive abilities with reading comprehension change over time. Nagy (1988) believes neither the traditional teaching of vocabulary involving looking up and defining words or inferring about words in context are effective by themselves but combined can be highly effective (p. 12). In other words, students benefit from both in context and out of context when used simultaneously to most effectively learn vocabulary.

Stahl and Fairbanks (1986) asked two questions. "Does vocabulary instruction have a significant effect on children's comprehension of the text? What types of vocabulary instruction are most effective?" The answer was yes to the first. The second question findings suggested the most effective teaching method for vocabulary was a combination of both vocabularies in context and comprehension when the vocabulary words are taught before the passage. According to Johnson-Glenberg (2005), using selected vocabulary within a text passage helps activate prior or background knowledge by linking sentences around the unknown word to real-world connection or association to the background knowledge. It helps the learner be interactive with the text and increases final comprehension and vocabulary acquisition. In a study conducted by Kilickaya and Krajka (2010), using online vocabulary in passages and traditional learning of vocabulary including using notebooks and cards, the online (in-context vocabulary) group

outperformed the traditional learning group. The online group, when retested three months later, retained the most vocabulary.

Kuhn and Stahl (1998) reviewed 14 studies on teaching vocabulary from context. In a study conducted by the National Reading Panel (2000), over 50 studies were reviewed on vocabulary. A summary of findings concluded that vocabulary learning was highest when the vocabulary was taught in context. Emphasis was placed on understanding the word used in context, not the learning of the definition or meanings of the words. According to Rupley and Nichols (2006), struggling readers have difficulty with reading comprehension due to limited vocabulary and teaching vocabulary with comprehension skills helps students show growth in reading.

Using Technology to Teach Vocabulary

Prensky (2001) stated that learners today are "digital natives." According to Prensky, learners of today "process information fundamentally differently from their predecessors" (p.1). Students have grown up in a world where technology is part of their lives from an early age. Many learners now use text messages, social media, and read electronic books. Electronic usage for information, communication, and learning are common with many areas going from traditional paper text to hypertext. Prensky (2001) stated that "the same methods that worked for the teachers when they were students will work for their students now" (p.3) is outdated and invalid. Basoz and Cubukcu (2014) conducted a study using computer-assisted language learning (CALL) and direct-teaching of vocabulary words to college freshmen learning English. Pre and post-tests were given to the participants. The post-test was delayed for five weeks to evaluate the retention of

the vocabulary words. Both groups showed gains but no significant differences between the groups.

In a study conducted by Gulek and Demirtas (2005), there were no baseline differences between the students who used computer-based and those non-technology based students. However, when the students worked on computers (laptops), they showed significant gains. Chen et al. (2008) stated that technology-enriched learning environments, including hand-held devices, laptops, serve as cognitive tools. According to a study conducted by Dreyer and Nel (2003), students benefit from strategies using both technology and teacher-directed or in-context reading strategies. The applications or programs such as Achieve3000 and Freerice help scaffold or build the student's vocabulary through cognitive learning. The student can work independently and at their own speed.

In 2001, research was conducted by Wood in the usage of vocabulary learning games or digital game-like formats as learning tools. He concluded that digital game-formats were more effective in vocabulary acquisition than traditional textbook methods. Digital-based vocabulary learning benefits should be considered when developing a curriculum for struggling reading students for several reasons. Learning vocabulary gives the students the ability to make meaning of the text, and comprehending the text, which in turn makes the material relevant to students. This, in turn, gives the student ownership of their learning through the access of web-based vocabulary programs. McIntyre and Pressley (1996) reported that active student involvement motivates the students, especially those who are struggling readers. Working with web-based tools, the students

become actively involved with visual, hands-on, and student-centered vocabulary activities.

According to Nagy (1988), neither the traditional teaching of vocabulary involving looking up and defining words or inferring about words in context are effective by themselves. O'Brien, Beach, and Scharber (2007) expressed that student motivation and engagement in the classroom determines whether the intervention or treatment will be meaningful or successful for the student. How does one teach high school students vocabulary in a way that will enhance and motivate the students to learn? Use web-based tools to motivate students, free web-based vocabulary programs, and purchased reading comprehension and vocabulary in context (interactive) computer-based programs.

Eren (2015) explained that students are tech-savvy, growing up with technology and social media as part of their everyday lives. The typical high school student has grown up with technology, using it to answer questions, and texting. Marzano and Brown (2007) conducted over 60 studies that investigated the usage of online vocabulary games in the classroom and the results or impact of their usage on vocabulary. In over 20 percent of the results, students showed improvement. According to Dalton and Grisham (2011), using web-based vocabulary tools to increase students' interaction with vocabulary, peak interest in the vocabulary, motivating, and increasing incidental vocabulary acquisition. Being able to access the vocabulary in a web-based format, helps to motivate student learning, unlike the traditional method of vocabulary acquisition, according to Gee (2003).

An investigative study using video technology tools for teaching vocabulary and reading comprehension in elementary schools was conducted by Xin and Rieth (2001).

Two groups of students were randomly chosen. Group one used video technology tools and were taught vocabulary in context. Group two (nontechnology) used a mixed method of vocabulary in context (text) and out of context (dictionary/word definitions). Xin and Rieth stated their findings as "Results of the study demonstrated that students in video-assisted anchored instruction statistically outperformed students in traditional instruction with a dictionary and printed texts on word meaning acquisition" (p. 99). Web-based vocabulary resources, digital tools, and instruction are available for multimedia learning. How does one determine the appropriateness of a web-based vocabulary program for the student?

In a recent empirical study of English vocabulary acquisition, conducted by Martí-Parreño, Méndez-Ibáñez, and Aldás-Manzano (2018), three variables or treatments were used: pen and paper, video clips and Quest for Knowledge (vocabulary out of context) educational video game. The video game helped to increase student motivation and academic performance. Results of the study statistically showed higher vocabulary acquisition over regular pen and paper activities. As per the above study, students using Freerice may repeat the vocabulary as many times as they wish, thus benefiting from repetition. Achieve3000 will give the student the preview of the word with a definition. It will then use the word in context, in a nonfiction passage. The student will answer questions and receive automatic feedback.

Teacher Directed Instruction

The traditional approach to vocabulary in lower level classes is teacher-directed instruction. The definition of direct or explicit teaching, according to Rupley, Blair, and Nichols (2009) "means imparting new information to students through meaningful

teacher-student interactions and teacher guidance of student learning" p. 126. Zhao and Zhu (2012) stated that the traditional teaching method is teacher-centered with the student learning vocabulary as part of the reading process. Vocabulary instruction, according to Zhao and Zhu, is from the bottom up process and involves teaching the individual vocabulary words, parts, or expressions before reading. According to Rupley, Blair, and Nichols (2009), guided practice or explicit instruction helps connect prior knowledge with new vocabulary. Gu (2003) indicated that many students learn vocabulary through guided practice such as memorization of words, definitions, word lists, flashcards, matching activities, graphic organizers, and word webs by teacher-directed lessons or instruction.

According to Jonassen (1996), teaching reading should be teacher-focused. The instruction should be skill-based and product-oriented. Direct or explicit vocabulary instruction, according to Oxford (1990) draws the students' attention to the word, definition, and the goal of learning the word. Direct instruction includes the word lists, dictionary usage (definitions, synonym, antonym, parts of speech, affixes and root words), repetition (verbal, written, flashcards), and memorization (visual images, graphic organizers, vocabulary notebooks), and association with prior background knowledge. Rosenshine (1995) noted that there are recommended instructional steps that a teacher should follow for direct instruction. These include reviewing work, introducing new materials, guiding the learner through practice, providing feedback, independent practice, and weekly reviews. Direct instruction approach and the following components can be linked to the schema theory by relating the new vocabulary or passage to background knowledge. The teacher is reviewing, modeling, using guided or step-by-step directions,

explaining the strategy or skill, and giving the student the opportunity to practice independently. According to Beck, McKeown, and Kucan (2002), an evaluated and effective method of teaching vocabulary includes giving students a list of words (8-10) each week. Students define, write sentences, discuss contexts or passages that contain the words and finally have weekly assessments. Flanigan and Greenwood (2007) asserted that vocabulary instruction should include strategies such as comparing and contrasting words, using illustrations, word walls, collaborative or group activities, word webs, and graphic organizers.

The Frayer model is one example of an instructional strategy used for vocabulary instruction. It makes use of graphic organizers to teach vocabulary. The graphic organizer is divided into four parts with the student defining the target word, characteristics, drawings, giving examples, and non-examples (opposite). It is based on research from Frayer, Fredrick, and Klausmeier (1969). According to Moody et al., (2018), the Frayer Model could be used for collaborative activities or engaging students in active learning and having a deeper understanding of the new words. Strategies such as pre-teaching of vocabulary and previewing comprehension questions before reading the passages are used by many content area teachers. This is helpful to many English language learners (ELL) in the classroom. The ELL learner will hear the word modeled and used correctly, understand what the question is asking, before reading the passage is read, according to Mihara (2011).

In a study conducted by Carlisle, Kelcey, and Berebitsky (2013), there is a lack of explicit vocabulary instruction and word strategies taught in many low-poverty schools. According to Pikulski and Templeton (2004), a comprehensive approach to teaching

vocabulary to students includes direct instruction of specific words, usage of dictionaries, and teacher modeling of vocabulary strategies. Moses (2001) stated that vocabulary should be taught and drilled through direct instruction. Johnson (1998) stated struggling students require intense instruction. The teacher's goal is to identify strategies, tools, and adapting instruction to improve vocabulary learning. When teaching vocabulary, Juel and Minden-Cupp (2000) reported that decoding, teacher modeling, and identifying words through direct instruction helps build word identification skills and new strategies for the remedial learner. These skills and strategies include learning how to break words apart or chunking, how to sound out a word (phonics/ phonemic awareness) and using background knowledge (schema) to predict the word and meaning.

In a study conducted by Jenkins, Matlock, and Slocum (1989), two methods of vocabulary instruction were studied, including teaching words directly and using the context clues strategy. The group taught vocabulary directly showed more word retention and growth than the group using context clues. In a study conducted by Naeimi and Foo (2015), English Speakers of Other Languages (ESOL) showed the most gains in directed (out of context) vocabulary instruction over in context vocabulary instruction. According to Biemiller (2009), studies have shown that ELL students are two years behind their native speaking counterparts in vocabulary. Marzano (2004) asserted that all students benefit from direct (out of context) instruction. Marzano developed six steps or strategies for teaching vocabulary. These steps include explain, restate, show, discuss, refine and reflect, and games. The vocabulary word is defined using a dictionary, research, then used as a description or example. The vocabulary word is restated by the student using the definition in their own words. The student shows the vocabulary word by drawing

their image or symbol of the word. The discussion takes place through telling a story or sharing experiences with peers that are associated with the vocabulary word. The vocabulary word is refined to a final definition through reflection and prior activities. Vocabulary games are played, such as Pictionary, charades, bingo, etc.

However, according to Carlisle (1993), students do not have a meaningful connection to the word due to the dictionary definition. Students find the meanings complicated with several different definitions, and do not know how to use the word in context. The words seem abstract to the student that does not have any prior knowledge of what the words mean. In the dual-route theory, according to Forster and Chambers (1973), there are two routes to word level reading. These are phonological recoding and direct access to recall or long-term memory. Usage of phonological skills, word attacks, sounding out or trying to decode an unknown word including nonsense words helps the reader. According to Vadasy et al. (2005), lack of word recognition or identification slows down the fluency or reading rate of the learner. The reading rate is another way to measure word level reading, which is thought to be best when students retrieve words from long term memory (called lexical access).

Carlisle suggested discussing vocabulary before reading so the students can activate prior knowledge and connect the information. Biemiller (2009) suggested directly teaching prefixes, suffixes to help with root word meanings, and add in decoding vocabulary to improve comprehension and connect to prior knowledge.

Allen (2006) stated that there are several ways to improve vocabulary. These include teacher modeled reading, context clues, word parts, word families, graphic organizers, and academic vocabulary acquisition, but the main way is to increase reading.

This might be done through read-aloud, the teacher modeled reading, literature circles, buddy reading, or independent reading. Allen emphasized that there are three ways a teacher can see if vocabulary instruction is meaningful and successful. These include whether the student can predict content, understand the content, and is successful when assessed about the content.

Graves (2000) determined that teachers need to use methods that explicitly teach specific words and word-learning strategies for students to understand the texts that contain those words. In other words, pre-teach the needed or intentional vocabulary. According to Beck et al. (2013), students need to see the word in context, how it is used and have the meaning explained in everyday language, so the student will retain and use the clues to figure out or use this strategy in the future. According to Kamil et al. (2008), as a student becomes older, it becomes more important for explicit instruction of vocabulary from textbooks and strategies to learn the words due to the complexity of the text.

Theoretical Framework

There are two alternative perspectives concerning how vocabulary can be rapidly acquired. The first perspective is that vocabulary is learned best within context. Vocabulary in-context is reading around an unknown word. The reader uses the sentences and words around it to figure out the meaning of the word. It is also referred to as contextualized learning. The second perspective is that vocabulary is best learned out of context. Vocabulary out of context is reading the unknown word and using multiple-choice to figure out the meaning of the word. The student memorizes the word and its meaning.

According to Weiser (2013), there is a direct link between lack of vocabulary knowledge and comprehension. To read fluently, the students must have the ability to accurately and without effort, identify vocabulary at the single word level. This is automaticity in reading and is linked directly to vocabulary knowledge. Hook and Jones (2002), which explains the lack of automaticity in word identification creates difficulties in the reader's ability to comprehend the text. The reader must use their working memory, stop to figure out the word, the meaning of the word, and then reread the sentence. This breaks the fluency and comprehension of the text with the student losing the ability to assimilate necessary information. According to O'Connor, Swanson, and Geraghty (2010), if students read too slowly, they lose comprehension and become unmotivated in reading. Students must read core subject textbooks at grade level, which is difficult for the student lacking vocabulary knowledge and is, therefore, reading below grade level.

Theories of Vocabulary Acquisition in Context

There are several different theories that pertain to vocabulary acquisition in context. These include the Schema theory, Self-teaching Hypothesis (2002), which incorporates an earlier finding first reported in Stanovich (1986) called the Matthew effect. These theories have in common an emphasis on the cognitive processing of reading-related information. According to Kendeou et al. (2014), the reader must have a coherent mental representation or process the text word by word, in their memory, and to comprehend what they are reading. It is interactive, with the reader decoding the vocabulary of what they are reading and making predictions. The reader must draw

inferences, use working memory of background knowledge, including vocabulary, and allocate attention to the text details when reading longer text sections.

Schema theory. The schema theory or learning theory was introduced by Sir Frederic Charles Bartlett in 1932. According to Bartlett (1932), there are key elements in the schema. These include memorizing, organizing, encoding, retrieving, and using the schema without thinking about it, and finally, the memorization remains and accumulates over time.

Later Minsky (1975) described this as memory in chunks of time, or a frame. This was called the frame theory. The learner encounters a problem or new situation, then refers back to a memory or frame. He related it to artificial intelligence similar to the computer stored frames of memories or data structure. Each frame is part of a network of frames or memories. These networks are linked together as a system. Information from different frames may be linked or drawn together by bits of information, details, and ideas.

Richard Anderson is credited for introducing the schema theory to the educational community. In reading Anderson (1977) pointed out, “every act of comprehension involves one’s knowledge of the world as well” (p. 369). According to Anderson (1978), knowledge and concepts are acquired from the world around us, processed, or organized and stored for long term memory. It expands and changes over time, according to the individual’s learning. Examples of learning schema in education might include content schema (knowledge of a topic), formal schema (structure of the text), and language schema (knowledge of vocabulary and words in the text). Rumelhart (1980) is credited with introducing the schema theory in reading. Rumelhart (1985) stated that background

knowledge (schema) played such a major role in reading comprehension, that the teacher should build background knowledge before teaching new words. This would enable the student to have the background knowledge to be able to guess the meaning of the word. According to Zhao & Zhu (2012), "schema theory views that the more schema students have, the better students predict" p 116. An (2013), determined that the schema theory guides the learner using their background knowledge to be interactive in reading. The learner relates the background knowledge to the new reading passage or vocabulary word and make predictions about the context to complete the reading process.

Readers' use prior, or background knowledge to learn, comprehend, and provide meaning to the text. According to Moody et al. (2018), the reader must play an active role, processing, using strategies, or constructing meaning during reading to explain or connect to the text. Using strategies such as creating concept maps, word webs, synonyms, antonyms, and analyzing features of the unknown words helps to connect to prior knowledge and produces a comprehension of the text. Lack of background knowledge makes it difficult for students in areas of vocabulary acquisition and reading comprehension. Schema theory in reading includes the reader combining their background knowledge and the information about the vocabulary word or text in the process of reading.

Willington and Price (2009) noted that students with limited background knowledge have difficulty with vocabulary acquisition or learning new words. The schema theory would be appropriate due to limited or prior knowledge of vocabulary, which limits reading and reading comprehension for the student. In the schema theory, readers use their background knowledge and life experiences to make sense or understand

new information or reading materials. The more one knows about a topic or subject; the more one can understand, infer, and retain the information. It is building background knowledge for the next passage. According to Klingner, Vaughn, and Boardman (2007), as a student reads and learns about a subject, they build background knowledge, and the next passage will be easier to comprehend.

Razi (2004) concluded that this is especially difficult for students from different cultures or speakers of other languages. They do not have prior experiences, background knowledge to try and connect with the new text or words in another language/culture they are reading. Hart and Risley (1995) stipulated that due to the students' limited or prior knowledge of vocabulary; the student is limited in reading ability and comprehension. According to Moore (n.d.) when students enter school with a limited vocabulary, do not have a reading intervention, and move from grade to grade, the gap widens. In a study conducted by Pearson, Hansen, and Gordon (1979) prior knowledge, pre-teaching, and teacher explicit/implicit teaching of the subject helps with the recall, connection, and building of schema.

The Self-Teaching Hypothesis and Matthew Effects. "For unto everything that hath shall be given, and he shall have abundance, but from him, that hath not shall be taken away even that which he hath." (Matthew, XXV: 29). In Stanovich's (1986) Matthew effect when applied to reading-the struggling readers remain at low levels and do not read, so their vocabulary does not grow. The good readers continue to progress and expand their vocabulary. Struggling readers have limited vocabulary, prior knowledge, and continue to fall behind. Rowe, Raudenbush, and Goldin-Meadow (2012) stated that reading difficulties begin early with learners who have limited vocabulary.

The learner with limited vocabulary reads less, and it affects reading comprehension in later years. Biemiller (2012) declared that the learner reading text with limited vocabulary will guess a word meaning but may not know the text surrounding the unknown word. Studies evaluated by Marculis and Neuman (2010) showed vocabulary from instruction, on average, can be maintained during a typical school year through second grade.

According to a study conducted by Duff, Tomblin, and Catts (2015), which included Grades 4 through 10, fourth-grade reading-word skills were directly related to vocabulary growth. According to Chall and Jacobs (2003), lack growth in vocabulary is called 'fourth-grade slump.' If the student does not have vocabulary growth on grade level, the student falls further behind classmates at each grade level. The study supported the Matthew effect of reading and vocabulary skills. Pikulski and Templeton (2004) stated that the drop in reading at this level, is due to a lack of vocabulary and background knowledge, affecting the student's ability in reading informational or content-based textbooks. According to Cunningham, Perry, Stanovich, and Share (2002) Self-Teaching Hypothesis, and the Matthew effects occur due to the way children acquire reading skills, largely on their own through practice. The Self-Teaching Hypothesis maintains that as students read, they learn vocabulary words as part of the reading comprehension process, such as by using context clues for unfamiliar words. Thus, to a large extent, children learn vocabulary on their own. Meanwhile, secondary students with reading difficulties require a more direct instruction approach since their reading difficulties impair their ability to learn vocabulary independently.

Vocabulary Acquisition Without Context

Instructivism Theory. Instructivism theory or approach is often called direct instruction. According to Diaz (2002), it is a traditional teacher-directed, with the transfer of knowledge from teacher to student. Traditional teacher-directed instruction focuses on skill-based learning using formal and summative assessments to determine vocabulary acquisition. The assessments help guide instruction. The learner uses memorization or rote memorization of material, but according to Schug, Tarver, and Western (2001) it includes lecturing, teacher modeling, or explaining. In the case of the Freerice program, a method of instruction for remediation using a web program. It is a content-based, repetitive, individual, and sequential instruction with extrinsic motivation. Freerice provides individual, sequential, repetitive out of context vocabulary instruction, with summative assessments in memorization or rote direct instruction method. The extrinsic motivation for the program comes in the form of donations of rice to world hunger and visual images of the number of rice earned in a bowl for each correct vocabulary word.

According to Baker, Simmons, and Kameenui (n.d.), the average student learns 3,000 or more words a year. The struggling student learns less, with the deficit gap expanding each year. Nation (1990), stated that there are 2,000 basic words found in the academic and technical vocabulary. Nation stated that learning words out of context help speed up the acquisition of vocabulary. The goal is to have independent word learning and not be reliant on other strategies such as context clues. The single focus on learning a word out of context is the word. It is not complicated with inferring from a passage or sentences. It helps with memory both long and short term. In a study conducted by

Amirian and Momeni (2012), the results showed vocabulary gains for the students in the out of context or definition-based learning group over the in-context group. Word recognition is the key to reading acquisition and comprehension, according to Stanovich (1991). However, as the learner increases in grade levels, word recognition and identification becomes more important as the content becomes more complex.

According to a study conducted by Amirian and Momeni (2012), learners were taught word meanings out of context (decontextualized) and words in context. The pre and post assessments showed higher vocabulary growth for the decontextualized group. In a different study conducted by Singer, Samuels, and Spiroff (1973), evidence showed that decontextualized printed words produced more rapid word recognition. According to Pefetti and Hogoboam (1975), learners being able to recognize words rapidly differentiates between good or poor comprehension skills. In a study conducted by Denton and Al Otaiba (2011), rapid word recognition is necessary for understanding and developing comprehension from print. If a learner does not know the word, over-reliance on context clues, avoidance of the word, and reading around it (context clues strategy) occurs and slows down the word recognition process. The learner infers the idea or content of the passage and may infer incorrectly. Pikulski and Templeton (2004) stated that major components of learning vocabulary should include directed instruction in the meanings of words, usage of dictionaries, thesauruses, and reference materials, and modeling of vocabulary strategies. According to Ebber and Denton (2008), older students avoid reading due to the lack of vocabulary knowledge. Students have difficulty understanding (inferring) meanings from new words when in context. According to Yu

and Smith (2007), rapid word learning or presenting many words in a short amount of time does not overwhelm the learner but shows considerable word learning.

Behavioral theory. According to Skinner (1957), language development is influenced by interactions with the environment. Language is acquired through principles of the operant condition, including imitation, practice, and reinforcement. Major strategies for the teaching of reading methods associated with Behaviorism includes phonics instruction, teacher-centered or direct teaching, bottom-up skills teaching, norm-referenced assessment, and controlled texts for reading difficulties. These skills can be observed, and behaviorism theory focuses on observable behavior.

Studies were conducted by Johnson, Gersten, and Carnine (1987) at the high school level using computer-based vocabulary word programs. Benefits from the programs included individualized instruction, immediate feedback, student motivation, and scaffolding of words/meanings. Students learn language based on reinforcement, both positive and negative. Examples include younger children repeating new words and being rewarded with food, hugs, and praise. As the child becomes older, positive reinforcement includes good grades or negative reinforcement for saying a bad word. High school students call on prior knowledge or mental representations to figure out new words and unknown text.

Learners who struggle with vocabulary and reading below grade level need motivation. According to Cameron and Pierce (1994), operant conditioning in the form of rewards can be used as motivation for the struggling learner. The motivation in the form of rewards might be anything from verbal praise, taking part in free time or tasks, meeting a grade or level expectation, etc. According to a study conducted by Pierce et al.

(2003), when the learner continues to achieve higher, more demanding goals, their intrinsic motivation increases. When operant conditioning is used in vocabulary learning, the struggling reader focuses on an unknown vocabulary word, they may receive motivation through their mental efforts, and retrieve or infer, the meaning of the word.

The Freerice website is an example of operant conditioning using positive reinforcement. With each correct (out of context) vocabulary word, the website donates 10 grains of rice (visual, extrinsic, motivation and reward) and 100 grains fill one bowl. The rice is donated to the United Nations World Food Program to help end world hunger. Students are encouraged to work and try harder to advance to the next level by the visual and competition with other students and classes. Students get the reinforcement by achieving different levels in the game and real-world philanthropy. According to Samkange (2015), the school environment should help the student with language acquisition through the usage of games, practice, and positive reinforcement.

Research Questions

The study intends to determine if improvement of vocabulary acquisition can occur from using web-based tools as an intervention for 11th and 12th-grade students. Research questions were developed for this study include:

1. Will students randomly assigned to the Achieve3000 only vocabulary intervention score higher on vocabulary as measured by a criterion reference vocabulary test and Achieve3000 Lexile measure than a control group that will receive traditional teacher-led vocabulary instruction?

2. Will there be a significant difference between the Achieve3000 only versus the Freerice only conditions with respect to performance on the Gates-MacGinitie Reading Test (GMRT) Grades 10 to 12, a norm-referenced reading comprehension test?

Chapter 3: Methodology

Introduction

The study addressed investigating the use of web-based vocabulary acquisition programs as tools to help strengthen vocabulary skills for struggling readers in 11th and 12th grade. Vocabulary acquisition skills are necessary to help readers with fluency, which helps reading comprehension. This study focused on the need to improve vocabulary for remedial high school students and which method or intervention such as in-context, out-of-context vocabulary acquisition using web-based tools (Achieve3000 and Freerice) or teacher-directed instruction, would show the most effective for this age group. The most appropriate track that guided this dissertation was a Quantitative research track. It was due to the research questions and proposed data collection methods, which included: performance measures, factual information, web-based electronic data collection, and classroom observations. The study used three methods of treatment or intervention to determine which treatment group showed the most improvement in vocabulary and ultimately reading comprehension.

Participants

The population of 11th and 12th-grade remedial students at the target high school in Florida were placed in reading classes during the 2018-2019 school year. The students placed in the second-semester classes served as a representative/population of remedial readers for the study.

The Demographic Information: Average age of the target population: 16 to 19 years old.

Gender: A number of females and males, was undetermined at the beginning of the study.

Non-probability sampling was used. The research was considered convenience sampling due to the availability of the class periods. Random drawing of class periods and variable/methods were chosen to be used for that period/class by the administration.

- Sample size was approximately 20-25 students in each group experiment.
- Approximately 80 students overall.
- Pre- and posttest were used for comparison for vocabulary & reading comprehension.

Instruments

The study used three instruments: the Lexile reading scores from Achieve3000, the designated passages, web-based vocabulary programs- Achieve3000 and Freerice.com. The pre and posttests instruments included Criterion reference vocabulary assessment and the Gates-MacGinitie Reading Test (GMRT) Grades 10 to 12, Form S.

Achieve3000. The program was developed in junction with MetaMetrics using a Lexile framework to measure nonfiction passages and vocabulary. The program uses the Bayesian scoring algorithm to update and continually measure a student from pre-test throughout the program until posttest. The student receives the pre-test to measure reading level or Lexile and is monitored throughout the program, increasing the Lexile as needed according to the student's progress. The posttest measures the student's final Lexile measurement. If a student achieves this level, it is considered high fidelity. Pre-posttest have 30-32 items. The posttest measures the student's final Lexile measurement. According to Achieve3000, over 35 million students within the United States receive

some type of Lexile measurements from various programs. The program offers three types of embedded scaffolding: intervention (struggling readers), language (English learners), and enrichment (advanced readers). Each student in the class received the same passage but on their tested grade level. The same passage was available in twelve different levels in English or eight levels in Spanish. According to the Achieve program (n.d.), students must score 75% or higher in order to master the passage or reading level.

Freerice.com. It is a web-based free vocabulary program developed by John Breen to teach vocabulary and fight world hunger. The program was donated to the United Nations World Food Programme in 2007. The vocabulary is out of context, presenting the word and multiple-choices for the definition. The levels of vocabulary begin at level 1 and continue through 60. As the student answers the vocabulary, they advance to the next level. As of December 18, 2018, no one in the researcher's previous classes had been able to advance past level 50. It remained a challenge for the participants with no participants reaching level 50 or beyond.

Criterion reference vocabulary assessment. Pre-determined vocabulary criteria were used in the design of the assessment. Passages from Achieve3000 and level sets from Freerice were used, and vocabulary was matched. Neither passages nor levels were used prior to the study. The assessment consisted of 30 multiple-choice target items with four choices for each item. It was used as a pre-test and post-test. Raw scores were used for all analyses.

Gates-MacGinitie Reading Test (GMRT) grades 10 to 12, Form S. It is a premade norm-referenced, grade level, reading comprehension assessment, graded on a 100 scale. It contains grade level reading passages and multiple-choice questions with

each passage. The reading comprehension assessment contains 11 passages and 48 multiple-choice, grade level assessment questions. It consists of fiction and nonfiction prose passages. The content, length, and styles of the passages vary. Skills include drawing inferences, main idea, or key ideas and details from the information in the passage. It is a timed 35-minute assessment. Raw scores were used for all analyses.

Procedures

First, all students taking part in this study were asked to complete the informed consent permission forms. All participants took the pre-tests and post-tests for Achieve3000, criterion-based test, and the Gates-MacGinitie Reading Test (GMRT).

Achieve3000 pre-test and posttests were given to all students. Students were given a Chromebook, sign in name, and password for Achieve3000. When students signed in, the pre-test automatically loaded. Students had to complete the assessment. It gave each student a Lexile (reading) baseline score. There was no time limit for the pre and posttests, but the test could have been completed in two class sessions (45 minutes each). The posttest was loaded according to Achieve3000 cut-off for the year.

The Gates-MacGinitie Reading Test Form S is a premade norm-referenced reading comprehension assessment for Grade levels 10 through 12. It contains grade level reading passages and multiple-choice questions with each passage. The reading comprehension assessment contains 11 passages and 48 multiple-choice grade level assessment questions. It consists of fiction and nonfiction prose passages. It is in a pre-made booklet format. Each student will be given a booklet and gridded answer sheet. It is a timed 35-minute assessment and was completed in one class period as class periods were 47 minutes each.

The criterion-based reference assessment assessed the selected or criteria vocabulary for the study. Students were given 30 vocabulary words in the form of one word multiple-choice, and one-word answers. Pre-test and posttests were used. The vocabulary assessment was conducted in one class period, which lasted for 47 minutes.

It was a field-based study conducted in an educational classroom with limited time per class period. Each of the classes was divided into three groups for the study. For each classroom, the student names were printed out using the attendance sheet, so each name was of uniformed size. The students' names were placed in a basket for each period or room. The principal agreed to choose the names randomly from the basket eliminating bias in the assignment of individuals to the groups. The student was assigned to the groups chronologically by rotation of the draw. It continued until all students in each classroom have been assigned to one of the three groups. One-third of the room was assigned to Achieve3000, one-third to Freerice, and one-third to teacher-directed study. Each group study technique that was utilized included 20 minutes allotted time reserved for vocabulary instruction and was strictly adhered to by a set timer for all groups.

The first variable was (vocabulary in context) Achieve3000. The website is a purchased program which uses vocabulary in context plus reading passages. Passages rotate on a weekly basis, but for this treatment, predetermined passages were chosen and assigned to match the second treatment Freerice, and control group vocabulary. Students were preassigned a password to access the program. The students signed in and passages appeared for the students to read and complete the required five steps. The student scores were automatically sent to the teacher's desk (website). It was timed for 20 minutes and strictly adhered to for the allotted limit. The Achieve pre-test had already been taken as

the district required it as a baseline Lexile for incoming students (new semester) and any new students assigned to the class in March.

The second variable (out-of-context) was Freerice.com, which is a free website. It has vocabulary out of context. It uses a single vocabulary word and gives the user multiple-choice definitions to choose from. Students in this group had already taken the required pre-test. The student registered on the Freerice.com website and Freerice word lists helped to keep track of scores. Students were required to write down their sign in names, as many students did not remember them. Students used the program for the 20 minutes strictly adhered to by the time limit. Levels were predetermined to match the criterion-based vocabulary. The researcher monitored the students with GoGuardian program (n.d.), which is a program that allows the researcher to see each students' computer screen from her laptop. This allowed the researcher to check to make sure the student signed in, on task or to answer any questions via the GoGuardian program without leaving the teacher-directed instruction group.

The third treatment was the control group. This group received no computer treatment or intervention; only the teacher guided vocabulary instruction. The instruction included various strategies such as word webs, graphs, vocabulary notebooks, etc. The control group was used to compare vocabulary growth using web-based tools versus teacher-guided instruction. Students took a pre-test. Students were required to keep a vocabulary notebook in the classroom and were given an average of five to ten words each week. Instruction included prefix/suffixes, word parts, word webs, etc. Instruction was timed for 20 minutes and strictly adhered to by a set timer. The variable was the amount of time allotted for vocabulary instruction during the study. Time became a

constant, not a variable. The group assignments were random due to the educational setting.

Statistical procedures included all students taking pre/post assessments. Analysis of covariance with follow-up planned comparisons between the groups were used. The same assessments were used to show growth/changes in each treatment group. A follow-up planned comparison between the groups was used to show which group showed the most gain in vocabulary acquisition over the designated time: web-based tools (in context versus out of context) versus teacher-guided instruction.

Design. It was a between subject, quantitative design with a pre-posttest control group design (see Table 1).

Table 1. *Depiction of the Implemented Pre- and Posttest Control Group Design*

Assignment	Group	Pre-test	Treatment	Posttest
R	1	O_1	X	O_2
R	2	O_1	Y	O_2
R	3	O_1	----	O_2
		Time ---->		

Note. R stands for random assignment, O stands for observation (for each instrument), and X and Y refer to the two treatment conditions.

Data Collection Procedures.

1. A criterion-based vocabulary assessment, Gates-MacGinitie Reading Test (GMRT), and baseline Lexile reading assessment were used to help establish beginning vocabulary and reading levels with each participant/group.
2. The same criterion-based vocabulary assessment, Gates-MacGinitie Reading Test (GMRT), and Lexile reading assessment were used as a posttest to measure growth with each group.
3. Web-based Electronic Data Collection-Progress monitoring with the Achieve3000 group was on-going through in-context vocabulary activities/reading comprehension scores.
4. Observations-Freerice.com were monitored by scores, word lists, teacher 5observation, and recorded scores.
5. Performance Measures/Behavioral Observations/Factual Information-Control group was monitored with traditional intervention activities.

Threats to validity included bias, technology (network) problems, student apathy towards the pre/posttests, and motivation. Internal validity threats included the amount of time (history) of the study, changes in maturity of the participants, the regression between pre/posttest timeframe, selection or in this case-class period that might have influenced the outcome since it is a random selection of the classes. During the timeframe of the study, mortality came into focus due to the student population in the form of moving, dropping out, and even a death, which affected the validity due to too many participants dropping out of the particular class period or out of the study.

How does one motivate or teach vocabulary to high school students? Motivation was an issue. It included student empathy towards test taking, whether it be a pre or

posttest and apathy toward participation in the study. To try and avoid bias in the selection of groups, the administration selected the groups and which treatment each group would receive without input from the researcher. However, the research needed to avoid bias toward the control group due to interaction with the group. The final validity issue was with the school network (technology). The same amount of time was allotted for each treatment in each group. Technology issues were addressed as the study progressed due to the history of school issues with the network. Limitations included human error, lack of random assignment which limited generalizability, unexpected factors that affected results, students' awareness of the study, and pre-existing factors. In nonequivalent groups, the groups were as similar as possible, but this was not a factor due to the limitations of the educational setting.

Data Analysis Procedures. Research and data were collected from all three variables. Group comparison was used after the data collection. Analysis of covariance was used. It was used to compare the means and variance both within the group and between the groups from the pre-test, treatment, and posttest. Conclusions were drawn using statistical or numerical data to show which group showed the most gains in vocabulary acquisition. It was research conducted in an educational classroom with limited time per class period.

Chapter 4: Results

Introduction

The study focused on investigating the usage of web-based vocabulary acquisition programs versus teacher-directed instruction (control group) to improve vocabulary for remedial high school students in Grades 11 and 12. Vocabulary acquisition skills are necessary to help readers with fluency, which helps reading comprehension. The study hypothesized the effectiveness of interventions such as in-context, out-of-context vocabulary acquisition using web-based tools (Achieve3000 and Freerice) or the control group, which received teacher-directed instruction (out-of-context). The Achieve3000 (in-context) purchased program had the target vocabulary words within the nonfiction passage. The Freerice (out-of-context) web-based program was free. It offered a vocabulary word with one-word multiple-choice answers. It repeated any missed words on a rotation basis. The control group, which was teacher-directed, used strategies such as the Frayer model graphic organizer, matching, prefix/suffix activities, etc. It was direct vocabulary instruction. The purpose of this applied dissertation study was to evaluate each approach (in-context, out-of-context, both computer-based programs), and the control group (teacher directed, out-of-context). The outcomes of the study will help guide the development of vocabulary curriculum, instruction, and usage of technology within the high school level to teach vocabulary.

Demographic Characteristics

The study's target population or participants in this study were remedial 11th and 12th-grade Florida public high school students (see Table 2). The original number of participants were to be 80. However, students were removed upon receiving passing

scores on SAT or the state assessment (FSA). This brought the count for the study down to 75 students. The students selected for participation in the study were assigned to the classroom due to previous Florida State Assessment results. From the seventy-five participants, six did not have permission to participate in the study. Five were moved to another classroom. One student was placed on homebound. Four students withdrew or transferred to another school. Five were ineligible due to their grade level (10th-grade).

The final count for participation in the study was 59 students. The students in the study ranged in ages from 16-19. The study had 39 boys and 20 girls of various races (see Table 2).

Table 2
Sample Demographics

Demographic	Frequency or *M* (*SD*)	%
Gender		
Male	39	66
Female	20	34
Grade Level		
11th Grade	37	63
12th Grade	22	37
Age Groups		
16 Year Olds	5	8
17 Year Olds	25	42
18 Year Olds	20	34
19 Year Olds	9	15
Ethnic Background		
African-American	20	34
Multi-racial	6	10
Hispanic	4	6
White	30	51

Note. n=59

Preliminary Findings

Preliminary analysis tests were conducted using SPSS in order to answer the

research questions. Univariate Analysis of Variance test was conducted for descriptive statistics. Pair-wise comparisons were used with the groups in order to review any significant levels of differences between the groups. In order to find the statistical differences between the means of the three groups, the Excel program with statistics was used. The groups in the study included: Group 1-Achieve3000 (in-context), Group 2-Freerice (out-of-context), and the Control group-teacher-directed instruction (out-of-context). A criterion-based vocabulary assessment, Gates-MacGinitie Reading Test (GMRT), and baseline Lexile reading assessment were used to help establish beginning vocabulary and reading Lexile levels with each participant within the groups.

All three groups were assigned the pre- and posttests on Achieve3000 program due to the district's requirement of recording students Lexile scores for the district. Achieve3000 provides vocabulary words in-context within a passage. Students were tested at the 10th-grade levels in reading with the Florida State Assessment (FSA). Students scoring a level one or level two on the FSA were placed in the Research 3 or Critical Thinking classes as per their grade levels.

The Lexile for students reading in Grades 11 and 12th should be at 1185L to 1385L according to the Achieve3000 (n.d.) program. Pre- and posttests were given to the Achieve3000 group. The pre-test scores showed that of the 59 students taking part in the study, only two students achieved at or near the recommended Lexile levels for grades 11 and 12. One student scoring an 1150 and another scoring 1220 Lexile's on the pre-tests. On the pre-test, three students scored below 225, which is grade one level or beginning reading level. Five students scored in the 500 level, which is Grades 2 to 3. Seven students scored in the 600 Lexile level, which is Grades 3 to 4. There were 17 students

that scored in the level 700L, which is Grades 4 to 5. Thirteen students scored in the 800L levels, which is Grades 4 to 6. Seven students scored in the 900L's which is Grades 6 to 8. Five students scored in the 1000L's level, which is Grades 9 to 11. The preliminary findings for the Achieve3000 group showed that a majority of the participants were reading below the 1185L Lexile level that was recommended for students in Grade 11.

Group 2 was assigned Freerice, which is a web-based vocabulary with the vocabulary presented out-of-context. The program presents the word and multiple-choice answers for the definition. Students assigned to the Freerice group were required to keep a Freerice vocabulary list with words and definitions for each level.

All groups received pre- and posttests on Gates-MacGinitie Reading Tests (GMRT), Level 10/12, and Form S. It is a premade norm-referenced reading comprehension assessment for Grade levels 10 through 12. It contains grade level reading passages and multiple-choice questions with each passage. The reading comprehension assessment contains 11 passages and 48 multiple-choices, grade level assessment questions. It consists of fiction and nonfiction prose passages. Students scored lower than expected on the pre-test, scoring at 69 to 79 percent.

Group 3 was the control group. The teacher-directed group, along with the other two groups, were given a criterion-based vocabulary assessment. The list of 30 pre-determined vocabulary criterion was used in the design of the assessment. Passages from Achieve3000 and level sets from Freerice were used to obtain matching vocabulary. Neither passages nor levels were used before the study. The assessment consisted of 30 multiple-choice target items with four choices for each item. It was used as a pre-test and

post-test. Raw scores were used for all analyses. Nine students out of the 59 scored 70% or above in the pre-test. Ten students scored in the 60% area. The remainder of the students scored below the 59% level in the pre-test. Further statistical testing was used to determine if there was a significant difference: mean, standard deviation, and significance value between the groups to answer the research questions.

Primary Findings

Primary findings used data obtained from the pre- and posttest Lexile reading level results from Achieve3000. The pre-test was administered in December/January, the posttest the third week in May as required by the school district. An analysis of covariance test (ANCOVA) was conducted on the Achieve3000 Level Set test for each group. This helped determine each group's Lexile levels. Students in the 11th and 12th-grade levels should be in the range of 1185L to 1385L Lexile. The tests were analyzed using SPSS and Excel spreadsheets. Descriptive statistics were used to show mean, standard deviation, and whether or not there was a significant difference or value between the groups. According to the pre- and posttests means, students were not reading on the 11th or 12th-grade level (see Table 3). Review of the raw gain and percent of gains for all groups show that group 2, or the Freerice group (out-of-context), showed the most gains among the groups, followed by group 3, the control group or teacher-directed instruction (out-of-context). Both groups used the out-of-context methods of vocabulary acquisition (see Table 3). Using Excel, pre- and posttests were calculated to determine percentile for each student. Overall percentile was calculated for the 59 participants in the study. Using SPSS, percentiles were calculated by analyzing the different groups using paired t-tests and comparing the t-tests and significance or *p* value.

Table 3

Achieve3000, Vocabulary Test (CBVT), Gates-MacGinitie Reading Test (GMRT), Segregated by Group

Measure	Pre-test Mean *(SD)*		Posttest Mean *(SD)*		Raw *Gain*	% Gain
			Group 1			
Achieve 3000 (reported as Lexiles)	778.91	229.81	825.65	277.533	46.74	0.06
Achieve 3000 (reported as Percentiles)	51		51		0	0.00
CBVT	43.83	13.793	46.57	20.631	2.74	0.06
GMRT	27.00	14.045	37.61	26.510	5.71	0.15
			Group 2			
Achieve 3000 (reported as Lexiles)	796.00	203.977	833.50	193.561	37.5	0.04
Achieve 3000 (reported as Percentiles)	51		51		0	0.00
CBVT	53.90	22.923	57.90	26.320	4	0.07
GMRT	31.90	21.983	46.85	29.314	14.95	0.32
			Group 3			
Achieve 3000 (reported as Lexiles)	767.81	824.06	824.06	213.528	56.25	0.07
Achieve 3000 (reported as Percentiles)	47		47		0	0.00
CBVT	50.56	25.259	49.25	26.871	-1.31	- 0.03
GMRT	30.87	22.265	42.81	28.856	11.94	0.28

Note: Raw gain is the amount of improvement from pre-test to posttest. Percent gain is the percentage of improvement from pre-test to post-test.

In order to look at the growth gains in Lexile of all the students, an Excel spreadsheet was used to list each group (the two treatment groups and control group) with pre- and posttest scores. To calculate the scores, a method or simple technique was used. Calculations: the new score minus the old score, then that score was divided by the old

score. This method helped to show gained growth for each student and within each group. Then the means and the standard deviation was calculated using the Excel program. The growth gains percentages varied among the three groups. Using SPSS to compare means, the researcher was able to review the means and standard deviations as well. Although groups made gains from pre- to the posttests in Achieve3000, there was little differences or gains showing in the posttest (see Table 3).

The null hypothesis: Will using on-line vocabulary programs (Achieve3000 & Freerice) improve vocabulary acquisition for 11th and 12th-grade remedial students over teacher-directed instruction? Alternative hypothesis: Will using teacher-directed instruction improve vocabulary acquisition over on-line vocabulary programs for 11th and 12th-grade remedial students? Looking at Table 3, there are no significant differences in gains between the groups. Improvement of all groups was low. Therefore, the null hypothesis is void. The same goes for the alternative hypothesis as there is no statistically significant difference among the groups. Using a 50 percentile formula, pre- and posttests were calculated in order to review the percentiles of each group. All groups were around 50 percentile, so all groups were fairly equally distributed on outcome. However, group 2 Freerice and group 3 the control group, teacher-directed instruction, both used out-of-context vocabulary methods, seemed to show a difference or slight improvement in gains.

Looking at the mean values pre- and posttests for the groups: 1-Achieve3000 (M=778.91, SD=229.81, M=825.65, SD=227.53). Group 2- Freerice (*M*=796, SD=208.31, M=833.5, SD=193.56). Control group-Teacher directed instruction (M=767.81, SD=203.98, M=824.06, SD=213.53), there was no significant difference

among the groups. However, group 2-Freerice (vocabulary out-of-context) seemed to show a difference, because the standard deviation was the smallest of all the groups in the study. A statement can be made based on Table 3, that Freerice (out-of-context vocabulary) was more effective in minimizing standard differential (see Table 3).

The percentage of growth (see Table 3) of all three went up. Group 2 Freerice came in first with raw and percentage of growth. Group 3 teacher-directed instruction came in second with Group 1 Achieve3000, which is required by the school district, came in last.

The research questions were answered using descriptive statistics. This included the mean and standard deviation for each question. A statement can be made based on Table 3 that Freerice (out-of-context) seemed to show a difference because the differential was the lowest of the three groups even though there were no significant differences among the three according to the *p*-value (see Table 4).

Research Question 1. The first research question asked: "Will students randomly assigned to the Achieve3000 only vocabulary intervention score higher on vocabulary as measured by a criterion reference vocabulary test and Achieve3000 Lexile measure than a control group that will receive traditional teacher-led vocabulary instruction?"

To answer research question 1, only data from the vocabulary posttests for two groups: Achieve3000 and Control group-teacher directed instruction were used. Participants in the study in both the Achieve3000 and control group-teacher directed instruction were given a criterion-based vocabulary assessment that assessed the selected or criteria vocabulary for the study. The 30-word multiple-choice vocabulary assessment was given as a pre- and posttest. The vocabulary assessment was conducted in one class

period, which lasted for 50 minutes.

Is there a significant difference between the means of group 1-Achieve3000 and the control group 3-Teacher-directed instruction? Statistical testing was used to determine if there was a significant difference using mean, standard deviation, and significance value between the Achieve group and the control group-teacher directed instruction. As stated previously, there were no significant differences among the three groups. However, there were increases in growth and gains among the various groups. Looking at the various differences, means, standard deviation and significance, the out of context groups showed the most gains. The descriptive statistics show the means and standard deviation for the vocabulary posttests. Looking at the mean values for only the posttests for the groups: group 1-Achieve3000 (*M*=825.65), group 2-Freerice (M=833.50) and Control group-Teacher directed instruction (*M*=824.06). The results for the posttest on the criterion based vocabulary assessment suggests an advantage for the Freerice group concerning the mean levels. Even though there was no significant difference among the groups (see Table 4).

Table 4

Pairwise Comparisons of Posttest Means among the Three Groups, While Controlling for Pre-tested Performance

	Group 1 Achieve 3000	Group 2 Freerice	Group 3 Control	1 vs 2		1 vs 3		2vs 3	
				t	*p*	*t*	*p*	*t*	*p*
Achieve 3000 (Percentiles)	51	51	47	.289	.776	1.193	.252	.816	.427
Achieve 3000 (Lexiles)	825.65	46.57	37.61	-.121	.572	.022	.287	.971	.287
CBVT	833.50	57.90	46.85	-1.582	.670	-.582	.670	.971	.287
GMRT	824.06	46.85	42.81	-1.582	.670	-.582	.572	.413	.572

Note. Degrees of freedom for the t-tests were 41, 37, and 34 for the group 1 versus group 2, group 1 versus group 3, and group 2 versus group 3, respectively.

Research Question 2. The second research question asked: "Will there be a significant difference between the Achieve3000 only versus the Freerice only conditions with respect to performance on the Gates-MacGinitie Reading Test (GMRT) Grades 10 to 12, a norm-referenced reading comprehension test. Comparing Means, Independent-Samples t-Test, and Paired-Sample t-Tests were used to determine if there were significant differences in tests that measured the Achieve3000 group versus the Freerice group. The Descriptive Statistics table gave the means and standard deviations and number of participants. In the Achieve3000 group, there were 23 students, and in the Freerice group, there were 20 students. Within-Subject Effects gave an overall significant difference with the means. The Pairwise Comparisons showed where the differences occurred, and the specific means differences (see Table 4).

As stated earlier, there were no significant differences among the groups according to the descriptive chart. Among groups 1 Achieve3000 and group 3 (control) teacher-directed instruction, the control group (3) showed the most improvement (see Table 4) with a raw gain of 56.25 and 0.07 % gain. Achieve3000 had a raw gain of 46.74 and a 0.06% gain. The pairwise comparisons and between-subject effects determined the posttest data to determine the means, differences, and significances between group 1 Achieve3000, and the control group (teacher-directed instruction) (see Table 4). The Achieve3000 had the least impact. The out of context vocabulary acquisition methods of Freerice and the control group showed the most gain (see Table 4).

Conclusion

The findings or statistics revealed that there were no significant differences

between the three groups: Achieve3000 (in-context), Freerice (out-of-context), and teacher-directed (out-of-context) instruction. However, results on posttests for the Gates-MacGinitie Reading Test (GMRT) and the criterion-based vocabulary test scores did go up. This included the Freerice and the control group, which was consistent with usage of out-of-context vocabulary acquisition methods. Gains were not sufficient, however, in order to change the statistical outcome of the ANOVA or means among the groups. Using the rule that there must be .05 to show significant differences, as stated previously, there were no significant differences between the groups. However, there was a significant improvement in Group 2, the Freerice group, and the teacher-directed instruction (control group 3) according to the means. Achieve3000 (in-context) group finished last with the least significance levels and means or improvement among the groups. Group 2 (Freerice-computer based) and Group 3-control group (teacher-directed instruction) showed the most gains and used out-of-context vocabulary instruction. When looking at the groups (Achieve3000 and the control group-Teacher-directed), one needs to be reminded of the number of participants in each group. Achieve had 23 participants, while Teacher-directed only had 16 participants. Was this a factor in the results of the study? That would be up for discussion in future studies.

Chapter 5: Discussion

Introduction

The purpose of this quantitative study was to investigate three different approaches to teaching vocabulary, two of which were web-based vocabulary acquisition programs. All three groups were given the same 30 vocabulary words in different teaching methods or approaches. The approaches included Achieve3000, a web-based purchased program that presents the vocabulary in-context or within the passage. Freerice was a free web-based game that presents the word (out-of-context) and then had multiple-choices for the answer. The teacher-directed instruction group were presented with the vocabulary words divided up and taught through traditional teaching methods such as word graphs, definitions, matching activities and were assessed on a weekly basis. The purpose of the study was to investigate the relative efficacy of two web-based vocabulary acquisition programs versus traditional teacher-directed instruction.

Summary of Findings

This section includes the results of the study. Results are summarized and delineated for each research question below.

Research Question 1. Will students randomly assigned to the Achieve3000 only vocabulary intervention score higher on vocabulary as measured by a criterion reference vocabulary test and Achieve3000 Lexile measure than a control group that will receive traditional teacher-led vocabulary instruction? This question was addressed by comparing pre-test scores and posttest scores of both the Achieve3000 and the teacher-directed instruction group. The Achieve3000 gave each student a Lexile or baseline pre-test score. This is the baseline for reading levels. Comparing the posttest with the posttest would

have shown growth accumulated by the student over the course of the nine-week study (see Table 3). Although each group made gains, the outcome was not sufficient to make a difference between the groups.

The criterion-referenced vocabulary test was used for all groups. Pre-determined vocabulary criteria were used in the design of the assessment. Passages from Achieve3000, level sets from Freerice were used, and vocabulary was matched. Neither passages nor levels were used before the study. The vocabulary test was composed of thirty words. The thirty words were broken into one group of ten words (due to spring break) and with the remaining words taught over the remainder of the study. Students took the posttest at the end of the nine weeks. Students took the vocabulary and Gates-MacGinitie (GMRT) pre-tests beginning of March and the three posttests the third week in May.

According to the ANOVA, there were no significant differences among the three groups. However, the Freerice group (out-of-context) and teacher-directed instruction group (out-of-context) showed higher results on the criterion-based vocabulary test than the Achieve3000 (in-context) when reviewing the data sets. As Carter (1992) indicated, vocabulary should be taught separately and not in-context. This was consistent with findings of studies that showed vocabulary taught out-of-context showed the most gains among participants. (Naeimi & Foo (2015), Marzono (2004).

Research Question 2. Will there be a significant difference between the Achieve3000 only versus the Freerice only conditions with respect to performance on the Gates-MacGinitie Reading Test (GMRT) Grades 10 to 12, a norm-referenced reading comprehension test? The findings indicated, as stated earlier, there were no significant

differences among the groups. The statistics were ran with all the data. According to the results of both the pre- and posttests for Achieve3000 and Freerice groups, Freerice scored higher than the Achieve3000 group according to the ANOVA. Expectations when viewing the percentile averages at 50% were surprising (see Table 4). If one group was truly different in outcome, the average would shift. All groups were around 50 percentile, so all groups were fairly equally distributed on outcome. The Achieve3000 (in-context vocabulary) had the least impact and showed the least gains among the three groups. The group 2-Freerice and group 3-teacher-directed instruction were close in growth gains. Both use out-of-context methods to teach vocabulary, one with a web-based program and the other through direct instruction. Kapp (2012) explained that usage of digital games to teach vocabulary, repetition of missed words, and rewards or points such in the Freerice program, help to give students positive reinforcement in learning vocabulary.

Interpretation of Findings

According to Tozcu and Coady (2004), students who used a computer-based text program showed higher scores in vocabulary acquisition. Out of all the groups, the Achieve3000 group scored the lowest of the three groups. The findings were not what was expected, with the expectation being second place for Achieve3000 and the teacher-directed instruction group being first before the study was conducted. The Achieve3000 group had the word used in-context within the passage. The word was listed alongside the passage with the definition as well posted. Students had to answer activity questions concerning the passage, referring back to the passage as needed. This would have exposed the vocabulary word several different times for the student. With the word in context and the multiple exposures, the posttest scores were not what was expected. The

Achieve3000 group had the largest participants at 23, with Freerice group at 20 and the control group at 16. According to the ANOVA, Achieve3000 was in the last place. Although the Achieve3000 program is used for FSA review along with building nonfiction vocabulary, future development of vocabulary lessons around program will have to be reviewed. This significant result will need to be reviewed along with the direction of vocabulary acquisition, the teaching of in-context vocabulary for the future development of lesson plans for remedial reading students in Grades 11th and 12th.

The second surprise was the results concerning groups 2 and 3, which was Freerice and teacher-directed instruction (control group). The surprise was how similar or close they were in means and other measurement results. Before the study took place, the control group- teacher-directed instruction group (out-of-context) was thought to be the group that would show the most growth since the vocabulary words were taught directly. Freerice (out-of-context vocabulary) was thought to be the treatment group that would come in last. Freerice gives students a word and then multiple-choice answers. The student could go as fast or as slow as needed. However, if the student missed the word, the word continued to pop up several times in repetition for the student. If the student missed too many words on a grade level, the program dropped the student down a level to help them build or scaffold their word knowledge. `

Martin-Chang et al. (2007) study results showed that students who learned vocabulary words out-of-context remembered, recalled, and retained more vocabulary when compared to in-context students. Although the Freerice group (out-of-context) showed the most improvement, it still did not show enough to make significant differences between the groups according to ANOVA. The surprise was that it did not

place third as expected. The expectations of third place were due to student motivation, attendance, and the fact it is a simple, inexpensive free web-based game. Motivation and attendance were issues throughout the study. Students had missed 13 days of classes due to state assessments and end of course tests. The schedule of interruptions due to testing did nothing to help student motivation in class. The students did not like sitting in a group for 20 minutes, two times a week. This was due to the setup of the room as stations. One group was Achieve3000 with headphones and Chromebooks, along with the second group Freerice with Chromebooks and headphones (to block the teacher-directed instruction, and the last group was with the teacher in a small circular grouping of desks. Explanations from the teacher did not help, and it took several meetings before the students realized it was to make sure the groups could not hear each other. Do not to treat them like 'babies' as one of the students informed the teacher. Absenteeism was at an all-time high at the high school as well. This was not just due to student absenteeism but also end of the year field trips, grade level meetings, award ceremonies, athletic signings, etc. Both helped to contribute to the less than motivated test results of all the groups. McIntyne and Pressley (1996) stated that getting students to be actively involved helps motivate students. Working with Chromebooks and web-based programs such as Freerice involves activity both visually and hands-on. It gives students ownership of their own learning.

Context of Findings

The literature review indicated that high school students struggle with vocabulary and are reading below grade level: this effects fluency and reading comprehension. Sedita (2005) stated that vocabulary is one of the key components of how well a student will be

able to read. It builds background knowledge and makes content relevant in reading. According to Chall and Jacobs (2003), a student's word knowledge is linked to academic success. They must be able to understand, comprehend grade-level core textbooks and new concepts. Vocabulary affects reading comprehension. Biancarosa and Snow (2004) stated that a large number of students with reading difficulties lack vocabulary and basic word skills. According to Beck, McKeown, and Kucan (2002), there are several reasons why students have difficulty with vocabulary acquisition. These include students with no background knowledge of the English language (ELL), lack of reading time outside of school, students with low-level reading abilities, grade-level textbooks, reading and language disabilities, and limited vocabulary knowledge. Hirsch (2003) stated a student needs to know between 90 to 95% of the words to comprehend the text.

As student progress in age to secondary level, vocabulary is not part of the curriculum other than academic core class content vocabulary. The current study analyzed Achieve3000-purchased computer program (vocabulary in-context), Freerice, a free computer program (vocabulary out-of-context), and teacher-directed (non-computer based)-out-of-context instruction. The findings of the study were close, but the out-of-context vocabulary acquisition methods (web-based and teacher-directed instruction) showed the most gains and growth in the study.

Implications of Findings

The results or findings from the research questions showed the need for more studies or research in several areas, including out-of-context vocabulary acquisition and web-based out-of-context vocabulary instruction at the high school level. The teaching or practice of teaching vocabulary is an area lacking in remedial reading classes. The study

was conducted over a nine-week period. According to the ANOVA, there were no significant differences among the three groups. However, the Freerice (out-of-context) and the teacher-directed group (out-of-context) scored higher than the purchased Achieve3000 group (in-context), which showed the least gains in growth. Results of the study would indicate that out-of-context vocabulary acquisition should be included in the remedial classes in order to improve not just vocabulary but reading comprehension as a result of the vocabulary acquisition.

In terms of theory, when a student lacks vocabulary knowledge, it may continue through the high school level. Each grade level presents a bigger challenge to the struggling reader. The struggling reader avoids reading, learns fewer words, and the gap widens. The student's fluency and comprehension decreases. Each year the reader becomes further behind their classmates. Stanovich (1986) called this the Matthew Effect. The Matthew Effect, upon reviewing the findings of the study, might be in place for those students who were assigned to Group 1- Achieve3000 (in-context vocabulary). The students had to read nonfiction passages on their grade levels with the vocabulary words embedded within the text. Looking at the self-teaching hypothesis, where students learn vocabulary through reading in-context, applied to Group 1-Achieve3000 (in-context), did not show improvement. There were a number of students who scored low on both the pre and posttest. Although there were no significant differences between the groups, the Achieve3000 (in-context) group showed the least growth or gain.

The behavioral theory could be observed in group 2-Freerice. Baumann, Kame'eniu, and Ash (2003) stated that indirect instruction or exposure to lots of new words gives the students opportunities to interact and develop vocabulary acquisition.

The National Reading Panel (2000), stated that usage of computers for vocabulary instruction could be more effective than the traditional teacher-directed method. At the high school level, it is easy to pitch a vocabulary computer game. The Freerice program is interactive with the student in that it gives 10 grains of rice in the bowl for each correct word. The rice goes to world hunger. One of the students brought in a bag of rice, and the class actually counted 100 grains that filled a bowl. The visual image, along with the idea that many people in this world only get one bowl of rice a day was stunning for the students. The students used the program by going at their own speed and writing down the words on their vocabulary sheet. When students misses a word, the word pops up on a rotating basis (repetition), several times. If a student misses too many words on a level, it will drop them automatically down a level until they master the level. It scaffolds word knowledge or acquisition. The repetition of the missed words, scaffolding of levels of words, and the word list all gave an extra reinforcement of the words in the Freerice program. The repetition of the missed words helped the students remember them. According to Webb (2007), repetition of unknown words increases knowledge of that word each time the learner sees it or encounters it. Webb stated that a student needed to see the word at least 10 times in order to gain full knowledge and usage of the word. This would be beneficial for remedial students and English Language Learners (ELL). In an empirical study conducted by Walters and Bozkurt (2009), the usage of vocabulary notebooks increases vocabulary acquisition for the ELL learner. The study showed increases in vocabulary acquisition of target words

In observing the Freerice group, the students became competitive not just among their classmates but would write their grains of rice amount on the board so that the next

class would see the challenge! This was halted because the Freerice vocabulary list was not being filled in and the competition became overwhelming. However, after the study was completed, Freerice was opened up to all students in class with challenges in each class. It is important that the teacher takes into consideration the method and type of instruction that will benefit and suit the students' ages.

Direct instruction (Instructivism) according to Beck, McKeown, and Kucan (2002) means teaching specific words, prefixes, suffixes, and root words to the student by the teacher. According to Sedita (2005), using specific words for direct instruction should include not just one definition but multiple meanings of the word, antonyms, synonyms, and word concepts. Stahl and Kapinus (2001) stated that direct instruction of vocabulary, student usage of strategies and techniques to figure out words, helps build background knowledge for reading comprehension. According to Skinner (1957) and the Behavioral theory, words are influenced and developed through interactions with the environment. In this study, it was evident in group 3-teacher-directed group through imitation (repeating the words, sounds, word parts), practice (word graphs, etc.) and reinforcement (weekly quizzes). Taylor, et al. (2009) stated explicit or direct instruction by the teacher in vocabulary acquisition helps build reading comprehension and fluency for the remedial or struggling student.

Taking into consideration of the findings of this study, the practice of out-of-context instruction and programs that use out-of-context instruction such as Freerice should be part of the remedial reading classroom in the high school setting. According to Oslund et al. (2018), lack of vocabulary knowledge, reading component skills, reading comprehension, and lack of intervention need to be addressed for the struggling reader to

improve. Integration and varying the instruction would increase the rigor and learning of vocabulary for the struggling reader, according to Graves (2000). It should include instruction in strategies, the teaching of individual words, lots of reading, and exposure to lots of words both visually and auditory as well.

Limitations of the Study

One of the limitations of this study included interruptions to the schedule of the intervention. These included end of the year assessments such as the end of course assessments, SAT school day testing, lower-grade level Florida State Assessment (FSA) testing for two days-no 11th or 12th-grade students were allowed on campus. The FSA 11th and 12th-grade retakes were 3 days. Finally, grade level assemblies were held over 3 days. Overall, 13 days were missed or lost, not including spring break, in the intervention schedule.

The second major limitations to the study were student motivation being affected by both the room set-up and the school testing schedules coinciding with this study. The schedule of interruptions due to testing did nothing to help student motivation in class. Students in the mornings were absent due to testing and were released to classes. After testing all morning, motivation was not at the highest level. The Freerice group seemed to be the most motivated among the three groups on testing days. The combination of earning Freerice and competition among students made this a game-like program. The setup of the room contributed to a lack of motivation. The setup of the room with students divided into groups, according to the students, made them feel they were in stations back in elementary or middle school. The students did not like sitting in a group for 20 minutes, two times a week. The room was arranged in groups. One group was

Achieve3000 with headphones and Chromebooks sitting opposite of the Freerice group. The second group, Freerice, had Chromebooks and headphones, sitting on the other side of the room. The last group was with the teacher in a small circular grouping of desks.

The third major limitations to the study were student absenteeism. In a study conducted by Gottfried (2019), chronic absenteeism means missing more than 10 percent of the school year. This affects reading and math scores, not just for the student but also for the school and district. There is an absenteeism policy in the study's district for truancy in which students are required to be in attendance during the 180 days of school; there is no statement on how many days they may miss. At the school where the study took place, after ten days, a call home is placed by the attendance department to parents. This is repeated; however, if the student continues to miss, the driver's license may be pulled or suspended. However, this had no effect on the students in the study who were 18 years old and over.

The fourth major limitations to the study were the reading comprehension assessment test used in the study. Although the GMRT is a highly recognized assessment test, students in the study found the lettering of the multiple-choice answers confusing. Instead of the traditional lettering of A through D or E through I, the GMRT uses A through T. The test then begins over again with A, repeating the A through T lettering. Many remedial students have difficulty remaining focused, and some have learning disabilities. Looking at the test booklet, then transferring over to the answer sheet with the different lettering of the test was too much for some of the students. Several students requested using their own paper and pencil and not the gridded answer sheets. The

modification from the gridded purchased answer sheets to a regular paper that could be numbered and lettered worked well with these students.

Participant effects were one of the threats to internal validity in this study. Other threats to internal validity in the study included maturation, history, and attrition. The study took place during the district testing schedules and student attitude toward taking another test, especially a pre-test, was not good. An example of this internal validity could be seen in the Gates-MacGinitie Reading Comprehension Test (GMRT) pre-test scores. When reviewing the pre and posttests of the GMRT among all three groups, one could see that this might question the validity or outcome of the study. Attrition or drop-out rates was another internal validity threat for the study. At the beginning of the study, there were 75 students eligible. Six did not give permission to take part in the study, four transferred or withdrew, one went to homebound, five were moved to another class, and five were in a lower grade level. Maturation or History was part of the internal validity threat, which was due to an unexpected reason. One of the 11th-grade students was killed in an accident that was in the 11th-grade class a few weeks before the study started. Grief counselors were assigned to the school for the junior class. Although it occurred before the study, it changed the atmosphere of the study and classroom. The maturation or fatigue continued throughout the study for the 11th-grade class. The 12th-grade class was busy with senior graduation activities, which deducted time from the study due to class level meetings, senior field trip, senior picnic, etc.

Future Research Directions

Future recommendations for research include scheduling or timing of pre and posttest, lengthening the study from nine weeks to a full school year, and having on

treatment each day on a rotation basis to prevent burn out of students and the researcher. The scheduling of the pre and posttests should not coincide with the district's testing schedules. This was a real issue for the study. It may have given false pre-test scores due to student empathy and risking the study's validity. The second recommendation is the length of the study. Using a full school year would give an adequate view of the students' abilities, weaknesses, and growth in the areas of vocabulary. Nine weeks is adequate, but a full year would give a more detailed view of growth and gains. This also gives a more flexible schedule for interruptions such as testing, unexpected situations such as school closings due to weather, or in this study's case, the death of a classmate.

A study on students that are provided with varied vocabulary instruction including direct instruction, word activities (graphs, word of the day, word walls, word webs, etc.) versus computer-based vocabulary games using out-of-context instruction, should be studied. The research might focus on repetition in both the computer-based and teacher-directed instruction and the effects on retention of the vocabulary acquisition over a period of time. Future studies might focus on absenteeism and the remedial high school students in Grades 11 and 12, including the effects on reading scores and Lexiles.

References

Achieve3000: Differentiated Instruction Solutions. (n.d.). http://achieve3000.com/

Allen, J. (2000). *Yellow Brick Roads: Shared and Guided Paths to Independent Reading,* 4-12. Portland, Me: Stenhouse.

Allen, J. (2006). What do we know about making vocabulary instruction meaningful? *Voices from the Middle, 13*(4). Retrieved from edtp620.pbworks.com/f /allen_vocab.pdf

Amirian, S.M., & Momeni, S. (2012). Definition-based versus contextualized vocabulary learning. *Theory and Practice in Language Studies, 2*(11). doi:10.4304/ tpls.2.11.2302-2307.

An, S. (2013). *Schema Theory in Reading*. Changchun University of Science & Technology, Changchun, China. Academy Publisher Manufactured in Finland.

Anderson, R. C. (1977). The notion of schemata and the educational enterprise: General discussion of the conference. In *Schooling and the Acquisition of Knowledge,* ed. Richard C. Anderson, Rand J. Spiro, and William E. Montague. Hillsdale, NJ: Erlbaum.

Anderson, R. C. (1978). Schema-directed processes in language comprehension. In *Cognitive Psychology and Instruction,* ed. Alan M. Lesgold, James W. Pellegrino, Sipke D. Fokkema, and Robert Glaser. New York: Plenum.

Anderson, R.C., & Nagy, W. (1993). The vocabulary conundrum. *American Educator: The Professional Journal of the American Federation of Teachers, 16* (4), 2. Retrieved from https://eric.ed.gov/?id=EJ458646

Annie E. Casey Foundation (2010). *Early warning! Why reading by the end of third-grade matters: A kid's count special report from the Annie E. Casey Foundation*. Baltimore, MD: Annie E. Casey Foundation. https://www.aecf.org/resources/early-warning-why-reading-by-the-end-of-third-grade-matters/

Baker, S.K., Simmons, D.C., & Kameenui, E.J. (n.d.). *Vocabulary Acquisition: Synthesis of the research-VDOE.* Retrieved from http://www.doe.virginia.gov/support/virginia_tiered_system_supports/training/higher_ed/vocab_acquisition_synthesis_of_research.pdf

Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. New York, NY, US: Cambridge University Press.

Basoz, T., & Cubukcu, F. (2014). The effectiveness of computer-assisted instruction on vocabulary achievement. *Mevlana International Journal of Education, 4*(1), 44-54. Retrieved from https://doi-org.ezproxylocal.library.nova.edu/10.13054/mije.13.77.4.1

Baumann, J.F., Kame'enui, E. J., & Ash, G. (2003). Research on vocabulary instruction: Voltaire. In J. Flood, D. Lapp, J.R. Squire & J. Jensen (eds.), *Handbook of research on teaching the English language arts.* Mahway, NJ: Lawrence Erlbaum, 752-785.

Beck, I.L, & McKeown, M. (1991). Conditions of vocabulary acquisition. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research,* Vol. 2, 789-814. Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.

Beck, I.L., McKeown, M.G., & Kucan, L. (2002). Choosing words to teach. *In Bringing Words to Life: Robust Vocabulary Instruction.* 15-30. New York, NY: Guilford Press.

Beck, I.L., McKeown, M.G., & Kucan, L. (2013). *Bringing words to life. Robust vocabulary instruction,* 2nd ed., New York: Guilford Press.

Biancarosa, C., & Snow, C. E. (2004). Reading next—A vision for action and research in middle and high school literacy: A report to Carnegie Corporation of New York (2nd ed.).Washington, DC: Alliance for Excellent Education.

Biemiller, A. (2005). Size and sequence in vocabulary development: Implications for choosing words for primary grade vocabulary instruction. In E. H. Hiebert and M. L. Kamil (Eds.), Teaching and learning vocabulary: Bringing research to practice, 223–242. Mahwah, NJ: Lawrence Erlbaum.

Biemiller, A. (2010). *Vocabulary development and implications for reading problems*. In A. McGill-Franzen & R. Allington (Eds.), Handbook of reading disabilities research, 208-218. New York, NY: Routledge.

Biemiller, A., & Boote, C. (2006). An effective method for building meaning vocabulary in the primary grades. *Journal of Educational Psychology, 98*(1), 44-62.

Birsch, J. R. (2011). *Multisensory teaching of basic language skills*, Third Edition. Baltimore, MD: Paul H. Brookes Publishing Company.

Boardman, A. G., Roberts, G., Vaughn, S., Wexler, J., Murray, C. S., & Kosanovich, M. (2008). Effective instruction for adolescent struggling readers: A practice brief. *Center on Instruction,* 1-45. Portsmouth NH: RMC Research Corporation Retrieved from https://files.eric.ed.gov/fulltext/ED521836.pdf

Braze. D., Tabor, W., Shankweiler, D.P., & Menc, W. E. (2007). Speaking up for vocabulary reading skill differences in young adults. *Journal of Learning Disabilities, 40*(3), 226-243. doi:10.1177/00222194070400030401

Bromley, K. (2004). Rethinking vocabulary instruction. *The Language and Literacy Spectrum, 14,* 3-12.

Budiansky, S. (2001). The trouble with textbooks. *Prism, 10*(6), 24-27.

Buenger, A., Butler, S., & Urrutia, K. (2010). A review of current research on comprehension instruction: A research synthesis. *Reading Technical Assistance Center,* 1-23. Retrieved from http://www2.ed.gov/programs/readingfirst /support/compfinal.pdf

Butler-Pascoe, M. E., & Wiburg, K. M. (2003). *Technology and Teaching English Language Learners.* Allyn and Bacon.

Butler, A.C., & Roediger, H.L. (2008). Feedback enhances the positive effects and reduces the negative effects of multiple-choice testing. *Memory & Cognition, 36*(3), 604-616. doi:10.3758/mc.36.3.604

Butler, S., Urrutia, K., Buenger, A., Gonzalez, N., Hunt, M., & Eisenhart, C. (2010). A review of the current research on vocabulary instruction. *National Reading Technical Assistance Center*. (NRTAC) Retrieved from https://www2.ed.gov/programs/readingfirst/support/rmcfinal1.pdf

Cambia, J., & Guthrie, J.T. (2013). Motivating and engaging students in reading. *The NERA Journal, 46*(1), 16-29.

Cameron, J., & Pierce, W.D. (1994). Reinforcement, reward, and intrinsic motivation: A Meta-analysis. *Review of Educational Research, 64*(3), 363-423. doi: 10.2307/1170677

Carlise, J. (1993). Selecting approaches to vocabulary instruction for the reading disabled. *Learning Disabilities Research and Practice, 8*(2), 97-105.

Carlise, J.F., Kelcey, B., & Berebitsky, D. (2013). Teachers' support of students' vocabulary learning during literacy instruction in high-poverty elementary schools. *American Educational Research Journal, 50*(6), 1360-1391. doi:10.3102/0002831213492844

Carnine, D.W., Silbert, J., Kame'enui, E.J., & Tarver, S.G. (2010). *Direct instruction reading,* 5th ed.) Upper Saddle River, NJ: Pearson.

Carter, R. (1992). *Vocabulary: applied linguistic perspectives.* NY: Routledge

Chall, J. S., Jacobs, V. A., & Baldwin, L. E. (1990). *The reading crisis: Why poor children fall behind*. Cambridge, MA: Harvard University Press.

Chall, J.S., & Jacobs, V.A. (2003). The classic study on poor children's fourth-grade slump. *American Educator, 27,* 14–15.

Chen, W., Tan, N.Y., Looi, C., Zhang, B., & Seow, P.S. (2008). Handheld computers as cognitive tools: Technology-enhanced environmental learning. *Research and Practice in Technology Enhanced Learning, 3*(03), 231-252. doi:10.1142/s1793206808000513

Clemens, N.H., Simmons, D., Simmons, L.E., Wang, H., & Kwok, O. (2016). The prevalence of reading fluency and vocabulary difficulties among adolescents

struggling with reading comprehension. *Journal of Psychoeducational Assessment, 35*(8), 785-798. doi:10.1177/073428291662120

Columbia County High School (9-12). *Identification/Intervention Decision Tree*. (n.d.). https://app5.fldoe.org/ReadingPlansSSO/CompleteReport1718.aspx#Iden

Conrad, N., & Deacon, S.H. (2016). Children's orthographic knowledge and their word reading skill: Testing bidirectional relations. *Scientific Studies of Reading, 20(*4), 349-347. https://doi.org/10.1080/10888438.2016.1183128

CPalms. (2013). *State of Florida's official source for standards and course descriptions*. htpps://www.cpalms.org/Public/Preview/13906

CPalms. (2013). *State of Florida's official source for standards and course descriptions*. htpps://www.cpalms.org/Public/Preview/13907

Cunningham, A.E., Perry, K.E., Stanovich, K.E., & Share, D.L. (2002). Orthographic learning during reading: Examining the role of self-teaching. *Journal of Experimental Child Psychology, 82*(3), 185-199.

Dalton, B., & Grisham, D. L. (2011). EVoc Strategies: 10 ways to use technology to build vocabulary. *The Reading Teacher, 64*(5), 306-317. doi:10.1598/rt.64.5.1

Davis, J., & Bauman, K. (2013). *School Enrollment in the United States: 2011-Census.gov.* Retrieved from https://www.census.gov/prod/2013pubs/p20-571.pdf

Denton, C. A., & Al Otaiba, S. (2011). Teaching word identification to students with reading difficulties and disabilities. *Focus on Exceptional Children, 2011:* 254245149. Retrieved from hpps://www.ncbi.nlm.nih.gov/pmc/articles/PMC4299759/

Diaz, D.P. (2002). Carving a new path for distance education research. *The Technology Source*. Retrieved from http://technologysource.org/article/carving_a_new_path_for_distance_education_research

Differentiated Instruction Solutions. Achieve3000 (n.d.). Retrieved from http://achieve3000.com/

Drouin, M., & Davis, C. (2009). R u txting? Is the use of text speak hurting your literacy? *Journal of Literacy Research, 41*(1), 46-67.

Dryer, C., & Nel, C. (2003). Teaching reading strategies and reading comprehension within a technology-enhanced learning environment. *System, 31*(3), 349-365.

Duff, D., Tomblin, J.B., & Catts, H. (2015). The influence of reading on vocabulary growth: A case for a Matthew effect. *Journal of Speech Language and Hearing Research, 58*(3), 853. doi:10.1044/2015_jslhr-l-13-0310

Durkin, D. (1979). What classroom observations reveal about reading comprehension instruction. *Reading Research Quarterly*, 1978-79, 14, 481-533.

Ebbers, S.M., & Denton, C.A. (2008). A root awakening: Vocabulary instruction for older students with reading difficulties. *Learning Disabilities: Research & Practice, 23*(2), 90-102. Retrieved from https://doi.org/10.1111/j.1540-5826.2008.00267.x

Eren, Omer. (2015). Vocabulary learning on learner-created content by using web 2.0 tools. *Contemporary Educational Technology, 6*(4), 281-300.

Fedora, P. (2014). What all reading teachers should know and be able to do. *Kappa Delta Pi Record, 50*(1), 24-30. Retrieved from http://search.proquest.com.ezproxy.local.library.nova.edu/docview/1651830329?accountid=6579

Flanigan, K., & Greenwood, S.C. (2007). Effective content vocabulary instruction in the middle: Matching students, purposes, words, and strategies. *Journal of Adolescent & Adult Literacy*, *51*(3), 226-238.

Florida Department of Education (2005d). School accountability reports. Retrieved from http://schoolgrades.fldoe.org/default.asp

Florida Standards Assessments (2017). Florida Department of Education. Retrieved from http://www.fldoe.org/accountability/assessments/k-12-student-assessment/results/2017.stml

Floyd, R., Gregg, N., Keith, T., & Meisinger, E. (2012). An explanation of reading comprehension across development using models from Cattell-Horn-Caroll Theory: Support for integrative models of reading. *Psychology in the School, 49*(8), 725-743. doi:10.1002/pts.21633

Forster, K. I., & Chambers, S. M. (1973). Lexical access and naming time. *Journal of Verbal Learning and Verbal Behavior*, *12*(6), 627-635. https://doi.org/10.1016/S0022-5371 (73)80042-8

Frayer, D.A., Fredrick, W.C., & Klausmeier, H.J. (1969). *A schema for testing the level of cognitive mastery*. Working paper no. 16. Wisconsin Research & Development Center. Madison: University of Wisconsin.

Freerice.com (n.d.). Play online, learn online, and feed the hungry. freerice.com

Fuchs, L.S., Fuchs, D., & Compton, D.L. (2010). Rethinking response to intervention at middle and high school. *School Psychology Review. 39*(1), 22-28.

Gallagher, K. (2003). *Reading Reasons: Motivational mini-lessons for middle and high school.* Maine: Stenhouse Publishers.

Gardner, H. (1993). *Multiple intelligences: The theory in practice Gardner-Multiple intelligences.* Retrieved from http://www.infed.org/thinkers/gardner.htm

Gee, J.P. (2003). What video games have to teach us about learning and literacy? *Technology Pedagogy & Education, 1*(1) 20. doi:10.1145/950566.950595

Goerss, B.L., Beck, I.L., & McKeown, M.G. (1999). Increasing remedial students' ability to derive word meaning from context. *Reading Psychology, 20*(2), 151-175.

GoGuardian. (n.d.). Chromebook Management Software for Schools. Retrieved from https://www.goguardian.com

Gottfried, M.A. (2019). Chronic absenteeism in the classroom context: Effects on achievement. *Urban Education, 54*(1), 3-34. https://doi.org/10.1177/0042085915618709

Graves, M.F. (2000). A vocabulary program to complement and bolster a middle-grade comprehension program. In Taylor, B.M. Graves, M.F., & Van Den Broek, P. (eds.), *Reading for meaning: Fostering comprehension in the middle grades*. New York: Teachers College Press, 116–135.

Gu, P.Y. (2003). Fine brush and freehand: The vocabulary-learning art of two successful Chinese EFL learners. *TESOL Quarterly*, *37*(1), 73-104.

Gulek, J. C., & Demirtas, H. (2005). Learning with technology: The impact of laptop use on student achievement. *Journal of Technology, Learning, and Assessment, 3*(2).

Harmon, J.M., Hedrick, W.B., & Fox, E.A. (2000). A content analysis of vocabulary instruction in social studies textbooks for grades 4-8. *The Elementary School Journal*, 100, 253-271.

Harmon, J.M., Hedrick, W.B., & Wood, K.D. (2005). Research on vocabulary instruction in the content areas: Implications for struggling readers. *Reading and Writing Quarterly, 21*(3), 261-280. doi:10.1080/10573560590949377

Harmon, J., & Wood, K. (2018). The vocabulary-comprehension relationship across the disciplines: Implications for Instruction. *Education Sciences 8,* (101). doi:10.3390/educsci8030101

Hart, B., & Risley, T. R. (1995). *Meaningful Differences in the Everyday* Experience *of Young American Children.* Baltimore, MD, US: Paul H Brookes Publishing.

Hasbrouck, J., & Glaser, D.R. (2012). Reading fluency: Understanding and teaching this complex skill. Austin, TX: Gibson Hasbrouck & Associates.

Hasbrouck, J.E., & Tindal, G. (1992). Curriculum-based oral reading fluency norms for students in grades 2 through 4. *Teaching Exceptional Children, 24* (3), 41-44.

Hasselbring, T.S., & Goin, L.I. (2010). Literacy instruction for older struggling readers: What is the role of technology? *Reading & Writing Quarterly, 20*(2), 123-144.

Hernandez, D. J. (2011). Double jeopardy: How third-grade reading skills and poverty influence high school graduation. *The Annie E. Casey Foundation*, 1-15.

Hirsch, E. D., Jr. (2003). Reading comprehension requires knowledge-of words and the world. *American Educator,* 10-44. Retrieved from https://www.aft.org /sites/default/files/periodicals/Hirsch.pdf. M.

Hock, M.F., Brasseur, I.F., Deshler, D.D., Catts, H.W., Marquis, J.G., Mark, C.A., & Stribling, J.W. (2009). What is the reading component skill profile of adolescent struggling readers in urban schools? *Learning Disability Quarterly, 32*(1), 21-38.

Hook, P.E., & Jones, S.D. (2002). The importance of automaticity and fluency for efficient reading comprehension. *International Dyslexia Association: Perspectives, 28*(1), 9-14.

Horst, M., Cobb, T., & Nicolae, I. (2005). Expanding academic vocabulary with an interactive on-line database. *Language, Learning, & Technology, 9*(2), 90-110.

Ilter, I. (2017). Concept-teaching practices in social studies classrooms: Teacher support for enhancing the development of students' vocabulary. *Educational Sciences: Theory & Practice, 17*, 1135-1164. http://dx.soi.org/10.12738/estp.2017.4.0343

Jeffes, B. (2016). Raising the reading skills of secondary age students with severe and persistent reading difficulties: Evaluation of the efficacy and implementation of a phonics-based intervention program. *Educational Psychology in Practice, 32*(1), 7384. Retrieved from http://search.proquest.com.ezproxylocal.library.nova.edu /docview/1826517675?accountid=6579

Jenkins, J. R., Matlock, B., & Slocum, T. A. (1989). Two approaches to vocabulary instruction: The teaching of individual word meanings and practice in deriving word meaning from context. *Reading Research Quarterly, 24*, 215-23.

Joftus, S., & Maddox-Dolan, B. (2003). *Left out and left behind: NCLB and the American high school.* Washington, DC: Alliance for Excellent Education.

Johnson, G., Gersten, R., & Carnine, D. (1987). Effects of instructional design variables on vocabulary acquisition of LD students: A study of computer-assisted instruction. *Journal of Learning Disabilities, 20*, 206-212.

Johnson-Glenberg, M.C. (2005). Web-based training of metacognitive strategies for text comprehension: Focus on poor comprehenders. *Reading and Writing (7-9)*, 755. Retrieved from http://search.ebscohost.com.ezproxylocal.library.nova.edu/login.aspx?direct=true&db=edsbl&AN=RN178348953&site=eds-live

Jonassen, D.H. (1996). *Handbook of research for education communications and technology.* New York: Simon & Schuster.

Joshi, R. M. (2005). Vocabulary: A critical component of comprehension. *Reading and Writing Quarterly: Overcoming Learning Difficulties, 21*(3), 209-219. Retrieved from http://dx.doi.org.ezproxylocal.library.nova.edu/10.1080/10573560590949278

Juel, C., & Minden-Cupp, C. (2000). One down and 80,000 to go: Word recognition instruction in the primary grades. *The Reading Teacher, 53* (4), 332-335.

K-12 Comprehensive Research-Based Reading Plans District: Columbia (2017). https://app5.fldoe.org/ReadingPlansSSO/CompleteReport1718.aspx?DID=12

Kamil, M.L., Borman, G.D., Dole, J., Kral, C.C., Salinger, T., & Torgensen, J. (2008). *Improving adolescent literacy: Effective classroom and intervention practices: A Practice Guide* (NCEE #2008-4027). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ies.gov/ncee/wwc/pdf/practice_Guides/adlit_pg_082608.pdf

Kapp, K.M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education.* San Francisco: Pfieffer.

Kendeou, P., Van Den Broek, P., Helder, A., & Karlsson, J. (2014). A cognitive view of reading comprehension: Implications for reading difficulties. *Learning Disabilities Research and Practice, 29*(1), 10-16. doi:10.1111/ldrp.12025

Kilickaya, F., & Krajka, J. (2010). Comparative usefulness of online and traditional vocabulary learning. *Turkish Online Journal of Educational Technology, 9*(2), 55-63.

Klingner, J. K., Vaughn, S., & Boardman, A. (2007). *What works for special needs learners. Teaching reading comprehension to students with learning difficulties.* New York, NY, US: Guilford Press.

Koren, S. (1999). Vocabulary instruction through hypertext: Are there advances over conventional methods of teaching? *TESL-EJ, 4*(1), 1-18. Retrieved from http://tesl-ej.org/ej13/a2.html

Kuhn, M.R., & Stahl, S.A. (1998). Teaching children to learn word meanings from context: A synthesis and some questions. *Journal of Literacy Research, 30*, 119-138.

Landauer, T.K., McNamara, D.S., Dennis, S., & Kintsch, W. (2007). *Handbook of Latent Semantic Analysis.* Mahway, NJ: Lawrence Erlbaum Associates.

Lipka, O., & Siegel, L. S. (2012). The development of reading comprehension skills in children learning English as a second language. *Reading and Writing: An Interdisciplinary Journal, 25*(8), 1873-1898.

Lockavitch, J. (n.d.). *Ten critical facts from vocabulary research: Failure-free reading.* Retrieved from http://www.failurefreeonline.com/n/downloads/TenCriticalReadingFacts.pdf

Malmgren, K. W., & Trezek, B. J. (2009). Literacy instruction for secondary students with disabilities. *Focus on Exceptional Children, 41*(6), 1-12.

Manzo, A. V., Manzo, U. C., & Thomas, M. M. (2006). *Rationale for systematic vocabulary development: Antidote for state mandates.* Newark: DE: International Reading Association.

Marulis, L.M., & Neuman, S.B. (2010). The effects of vocabulary intervention on young children's word learning: A meta-analysis. *Review of Educational Research, 80*(3), 300-335. Retrieved from https://doi.org/10.3102/0034654310377087

Marulis, L.M., & Neuman, S.B. (2013). How vocabulary interventions affect young children at risk: A meta-analytic review. *Journal of Research on Educational Effectiveness, 6*(3), 223-262. doi:10.1080/19345747.2012.755591

Martí-Parreño, J., Méndez-Ibáñez, E., & Aldás-Manzano, J. (2018). Effectiveness of educational video games in vocabulary acquisition: an experimental design. In E. Langran & J. Borup (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference.* (446-450). Washington, D.C., United States: Association for the Advancement of Computing in Education (AACE).

Martin-Chang, S., Levy, B., & O'Neil, S. (2007). Word acquisition, retention, and transfer: Findings from contextual and isolated word training. *Journal of Experimental Child Psychology, 96*, 37-56.

Marzano, R.J. (2004). *Building background knowledge for academic achievement: Research on what works in schools.* Alexandria, VA: Association for Supervision and Curriculum Development (ASCD).

Marzano, R.J., & Brown, J.L. (2007). *The art and science of teaching: A comprehensive framework for effective instruction.* Alexandra VA: ASCD.

Mayer, R.E. (2002). Rote versus meaningful learning. *Theory into Practice, 41*(4), 226-232.

McIntyre, E., & Pressley, M. (Eds.). (1996). Balanced instruction: Strategies and skills in whole language. Norwood, MA: Christopher-Gordon.

Mihara, K. (2011). Effects of pre-reading strategies on EFL/ESL reading comprehension. *TESL Canada Journal 28*(2), 51-73. Retrieved from http://files.eric.ed.gov/ulltext/EJ935410.pdf

Min, H.-T. (2008). EFL vocabulary acquisition and retention: Reading plus vocabulary enhancement activities and narrow reading. *Language Learning*, *58*(1), 73-115. doi:10.1111/j.1467-9922.2007.00435.x

Minsky, M. (1975). A framework for representing knowledge. In *The Psychology of Computer Vision*, ed. Patrick H. Winston. New York: McGraw-Hill.

Moody, S., Hu, X., Kuo, L., Jouhar, M., Xu, Z., & Lee, S. (2018). Vocabulary Instruction: A Critical Analysis of Theories, Research, and Practice. *Education Sciences, 8*(4), 180. doi:10.3390/educsci8040180

Moore, D.W. (n.d.). Why vocabulary instruction matters. *Best practices in secondary education.* National Geographic Learning/Cengage. Retrieved from http://ngl.cengage.com/assets/downloads/edge_pro0000000030/am_moore_why_vocab_instr_mtrs.pdf

Moses, F. (2001). The structural drill in remedial teaching. *The Internet TESL Journal, 7*(7). Retrieved from http://iteslj.org/Techniques/Moses-Drill.html

Musu-Gillette, L., de Brey, C., McFarland, J., Hussar, W., Sonnenberg, W., and Wilkinson-Flicker, S. (2017). *Status and trends in the education of racial and ethnic groups 2017* (NCES 2017-051). U.S. Department of Education, National Center for Education Statistics. Washington, DC. Retrieved from http://nces.ed.gov/pubsearch

NAEP Report Cards-Home. (2017). Retrieved from https://www.nationsreportcard.gov/

Naeimi, M., & Foo, T.C. (2015). Vocabulary acquisition through direct and indirect learning strategies. *English Language Teaching, 8*(10). doi:10.5539/elt.v8n10p142

Nagy, W.E. (1988). *Teaching vocabulary to improve reading comprehension.* Urbana, II: International Reading Association.

Nagy, W.E., & Anderson, R.C. (1984). How many words are there in printed school English? *Reading Research Quarterly, 19* (3), 304-330.

Nagy, W. E., Anderson, R. C., & Herman, P. A. (1987). Learning Word Meanings From Context During Normal Reading. *American Educational Research Journal*, *24*(2), 237–270. Retrieved from https://doi.org/10.3102/00028312024002237

Nagy, W. E., & Scott, J. A. (2000). Vocabulary processes. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.). *Handbook of reading research*, 3, (269-284). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Nash, H., & Snowling, M. (2006). Teaching new words to children with poor existing vocabulary knowledge: A controlled evaluation of the definition and context methods. *International Journal of Language & Communication Disorders, 41*(3), 335-354. doi:10.1080/13682820600602295

Nassaji, H. (2003). L2 vocabulary learning from context: strategies, knowledge sources, and their relationship with success in L2 lexical inferencing. *TESOL Quarterly, 37*(4), 645-670.

Nation, I.S. (1990). *Teaching and learning vocabulary.* Boston: Heinle & Heinle.

National Assessment of Educational Progress: NAEP (2015). *The nation's report card: Reading infographic.* Retrieved from NAEP website https://www.nationsreportcard.gov/reading_math_2015/files/infographic_2015_reading.pdf

National Center for Education Statistics. (2013). *The Nation's Report Card: A First Look: 2013 Mathematics and Reading* (NCES 2014-451). Institute of Education Sciences, U.S. Department of Education, Washington, D.C.

National Reading Panel. (2000). *Report of the National Reading Panel--Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature on Reading and Its Implications for Reading Instruction.* Washington, D.C.: National Institute of Child Health and Human Development.

Nelson, B. (1998). Web-based vocabulary activities: pedagogy and practice. *Computer-Assisted Language Learning, 11*(4), 427-435.

Nelson, D. L. (2008). A context-based strategy for teaching vocabulary. *English Journal, 97*(4), 33-37.

No Child Left Behind (NCLB). (2001). *The no child left behind act of 2001.* Public Law PL 107110. Retrieved from http://www2.ed.gov/nclb/landing.jhtml

Nomass, B.B. (2013). The impact of using technology in teaching English as a second language. *English Language and Literature Studies, 3*(1), 111-116.

O'Brien, D., Beach, R., & Scharber, C. (2007). "Struggling" middle schoolers: Engagement and literate competence in a reading-writing intervention class. *Reading Psychology, 28*(1), 51–73. doi:10.1080/02702710601115463

O'Connor, R. E., Swanson, H. L., & Geraghty, C. (2010). Improvement in reading rate under independent and difficult text levels: Influences on word and comprehension skills. *Journal of Educational Psychology, 102*(1), 1-19. Retrieved from http://dx.doi.org/10.1037/a0017488

Oslund, E. L., Clemens, N.H., Simmons, D.C., & Simmons, L.E. (2018). The direct and indirect effects of word reading and vocabulary on adolescents' reading comprehension: Comparing struggling and adequate comprehenders. *Reading and Writing, 31*(2), 355.

Ouellette, G. P. (2006). What's meaning got to do with it: The role of vocabulary in word reading and reading comprehension? *Journal of Educational Psychology, 98*(3), 554-566. doi:10.1037/0022-0663.98.3.554

Oxford, R. (1990). *Language learning strategies: What every teacher should know*. Boston: Heinle and Heinle.

Pearson, P. D., Hansen, J., & Gordon, C. (1979). The effect of background knowledge on young children's comprehension of explicit and implicit information. *Journal of Reading Behavior, 11*(3), 201-209.

Perfetti, C.A. (1985). *Reading ability.* New York: Oxford University Press

Petress, K. (2008). What is meant by "active learning?" *Education*, 128(4), 566-569.

Petscher, Y., Kershaw, S., Koon, S., & Foorman, B. R. (2014). *Testing the importance of individual growth curves in predicting performance on a high stake reading*

comprehension test in Florida (REL 2014-006). Washington DC: U.S. Department of Education, Institute of Educational Sciences, National Center for Educational Evaluation and Regional Assistance, Regional Educational Laboratory Southeast. Retrieved from http://eric.ed.go/fulltext/ED544677.pdf

Pierce, W.D., Cameron, J., Banko, K.M., & So, S. (2003). Positive effects of rewards and performance standards on intrinsic motivation. *The Psychological Record, 53*(4), 561-578. doi:10.1007/bf03395453

Pikulski, J.J., & Templeton, S. (2004). Teaching and developing vocabulary: Key to long-term reading success. *Current Research in Reading/Language Arts*. Reading: Houghton Mifflin. Retrieved from https://www.eduplace.com/marketing/nc/pdf/author_pages.pdf

Popham, W. J. (2001). Teaching to the test. *Educational Leadership, 58*(6), 16-20.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6.

Pressley, M. (2000). *Comprehension instruction: What makes sense now, what might make sense soon?* In M.L. Kamil, P. Mosenthal, P.D. Pearson, & R. Barr (Eds.), Handbook of Reading Research: Volume III. New York: Longman. Retrieved from http://www.readingonline.org/articles/handbook/pressley/index.html

Rash, J., Johnson, T.D., & Gleadow, N. (1984). Acquisition and retention of written words by kindergarten children under varying conditions. *Reading Research Quarterly, 19* (4), 452-460. doi:10.2307/747916

Rasinski, T.V., Padak, N.D., McKeon, C.A., Wilfong, L.G., Friedauer, J.A., & Heim, P. (2005). Is reading fluency a key for successful high school reading? *Journal of Adolescent and Adult Literacy, 49* (1), 22-27.

Razi, S. (2004). The effects of cultural schema and reading activities on reading comprehension. In *Singhal, M. Proceedings of the First International Online Conference on Second and Foreign Language Teaching and Research-September 25-26. The Reading Matrix Inc.*, Retrieved from http://www.readingmatrix.com/conference/pp/proceedings/razi.pdf

Reardon, S.F., Valentino, R.A., & Shores, K.A. (2012). Patterns of literacy among U.S. students. *Future of Children Organization, 22*(2), 17-37.

Relan, A., & Gillani, B.B. (1997). Chapter –Web-based instruction and the traditional classroom: Similarities and differences. In *Web-based Instruction,* (41-46) Englewood Cliffs, NJ: Educational Technology Publications

Reynolds, B. L. (2014). Evidence for the task-induced involvement construct in incidental vocabulary acquisition through digital gaming. *The Language Learning Journal, 45*(4), 466-484. doi:10.1080/09571736.2014.938243

Roberts, G., Torgesen, J.K., Boardman, A., & Scammacca, N. (2008). Evidence-based strategies for reading instruction of older students with learning disabilities. *Learning Disabilities Research & Practice, 23*(2), 63-69. doi:10.111l/j.1540-5826.2008.00264.x

Rosenshine, B. (1995). Advances in research on instruction. *Journal of Educational Research, 88,* 262-268.

Rowe, M.L., Raudenbush, S.W., & Goldin-Meadow, S. (2012). The pace of vocabulary growth helps predict later vocabulary size. *Child Development,* 83 (2), 508-525. doi:10.1111/j.1467-8624.2011.01710.x

Rubin, Jim. (2008). Turning the page on learning new vocabulary. *Reading Matrix: An International Online Journal, 8*(2), *1-9.*

Rumelhart, D.E. (1980). Schemata: The building blocks of cognition. In *Theoretical Issues in Reading Comprehension,* ed. Rand J. Spiro, Bertram C. Bruce, and William F. Brewer. Hillsdale, NJ: Erlbaum.

Rumelhart, D.E. (1985). *Toward an interactive model of reading*. Newark, DE: International Reading Association, p. 47.

Rupley, W. H., Blair, T.R., & Nichols, W.D. (2009). Effective reading instruction for struggling readers: The role of direct/explicit teaching. *Reading & Writing Quarterly, 25*(2-3), 125-138.

Rupley, W. H. & Nichols, W.D. (2006). Vocabulary instruction for the struggling reader. *Reading & Writing Quarterly,* 2(3), 239-260. doi:10.1080/10573560590949368

Salinger, T. (2011). Addressing the "crisis" in adolescent literacy. Paper prepared for the U.S. Department of Elementary and Secondary Education, Smaller Learning Communities Program, Herndon, VA.

Samkange, W. (2015). Examining Skinner's and Bandura's ideas on language acquisition: Implications for the teacher. *Global Journal of Advanced Research, 2*(11), 1858-1863.

Samuels, S. J., & Flor, R. F. (1997). The importance of automaticity for developing expertise in reading. *Reading & Writing Quarterly: Overcoming Learning Difficulties, 13*(2), 107-121. Retrieved from http://dx.doi.org/10.1080/1057356970130202

Schatz, E.K., & Baldwin, R.S. (1986). Context clues are unreliable predictors of word meanings. *Reading Research Quarterly, 21*(4). doi:10.2307/747615

Schug, M.C., Tarver, S.G., Western, R.D. (2001). Direct instruction & the teaching of early reading: Wisconsin's teacher-led insurgency. *Wisconsin Policy Research Institute Report, 14*(2), 1-35.

Sedita, J. (2005). Effective Vocabulary Instruction, *Insights on Learning Disabilities*, 2 (1), 33-45.

Simon, M. (2010). Assessment versus achievement: Winner takes all! *Florida Journal of Educational Administration & Policy, 3*(2), 73-85.

Singer, H., Samuels, S. J., & Spiroff, J. (1973-1974). The effect of pictures and contextual conditions on learning responses to printed words. *Reading Research Quarterly, 9*(4), 555-567. Retrieved from http://dx.doi.org/10.2307/747002

Skinner, B. F. (1938). *The Behavior of organisms: An experimental analysis*. New York: Appleton-Century.

Skinner, B. F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.

Sprick, R.S. (2013). *Discipline in the secondary classroom: A positive approach to behavior management* (6th ed.). Hoboken: Wiley.

Stahl, K.A., Bravo, M.A. (2010). Contemporary classroom vocabulary assessment for content areas. *Reading Teacher, 63*(7), 566-578.

Stahl, S. A. (2005). "Four problems with teaching word meanings (and what to do to make vocabulary an integral part of instruction)," in E. H. Hiebert and M. L. Kamil (eds.), *Teaching and learning vocabulary: Bringing research to practice*, Mahwah, NJ: Erlbaum.

Stahl, S. A., & Fairbanks, M. M. (1986). The effects of vocabulary instruction: A model-based meta-analysis. *Review of Educational Research, 56*(1), 72-110. Retrieved from.nova.edu/docview/85479247?accountid= 6579

Stahl, S. A., & Kapinus, B. (2001). *Word power: What every educator needs to know about teaching vocabulary*. Washington, D.C.: National Education Association.

Stanovich, K.E. (1986). Matthew effects in reading: Some consequences of individual differences in acquisition of literacy. *Reading Research Quarterly*, *21*(4), 360-407. doi:10.1598/rrq.21.4.1

Stanovich, K. E. (1991). Changing models of reading and reading acquisition. In L. Rieben & C. A. Perfetti. *Learning to read: Basic research and its implications*, 19-31. Hillsdale, NJ: Erlbaum

Student Access to Digital Learning Resources Outside of the Classroom. (2017). Retrieved July 1, 2019, from https://nces.ed.gov/pubs2017/2017098/ind_15.asp

Taylor, B. D., Mraz, M., Nichols, W. D., Rickelman, R. J., & Wood, K. D. (2009). Using explicit instruction to promote vocabulary learning for struggling readers. *Reading & Writing Quarterly*, *25*(2), 16. Retrieved from http://search.proquest.com.ezproxylocal.library.nova.edu/docview/61885693?accountid= 6579

Technology Resources Inventory. (n.d.). Retrieved from http://www.flinnovates.org/TRI/Report/SchoolInventory

The Lexile Framework for Reading. (2018). https://lexile.com/

Tighe, E.L., Wagner, R.K., & Schatschneider, C. (2015). Applying a multiple group causal indicator modeling framework to the reading comprehension skills of third,

seventh, and tenth-grade students. *Reading and Writing: An Interdisciplinary Journal, 28*(4), 439-466. Retrieved from http://search.proquest.com.ezproxylocal.library.nova.edu/docview/1697486915?accountid=6579

Tilstra, J., McMaster, K., Van, D.B., Kendeou, P., & Rapp, D. (2009). Simple but complex: Components of the simple view of reading across grade levels. *Journal of Research in Reading, 32*(4), 383-401. Retrieved from http://search.proquest.com.ezproxylocal.library.nova.edu/docview/61841187?accountid=6579

Tozcu, A., & Coady, J. (2004). Successful learning of frequent vocabulary through CALL also benefits reading comprehension and speed. *Computer Assisted Language Learning, 17*(5), 473-495.

Vacca, R.T., & Vacca, J. L. (2002). *Content-area reading: Literacy and learning across the curriculum* (8th ed.). Boston, MA: Allyn and Bacon.

Vadasy, P.F., Sanders, E.A., & Peyton, J.A. (2005). Relative effectiveness of reading practice or word-level instruction in supplemental tutoring: How text matters. *Journal of Learning Disabilities, 38*(4), 364-380.

Walters, J., & Bozkurt, N. (2009). The effect of keeping vocabulary notebooks on vocabulary acquisition. *Language Teaching Research, 13*(4), 403–423. Retrieved from https://doi.org/10.1177/1362168809341509

Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics, 28*(1), 46-65. Retrieved from https://doi.org./10.1093/applin/aml048

Weiser, B. (2013). *Effective vocabulary instruction for kindergarten to 12th-grade students experiencing learning disabilities*. Retrieved from https://council-for-

learning-disabilities.org/effective-vocabulary-instruction-for-kindergarten-to-12th-grade-students-experiencing-learning-disabilities

Wells, J., & Lewis, L. (2006). *Internet access in U.S. public schools and classrooms: 1994-2005 (NCES 2007-020).* U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2007020

West, M.R. (2018). A disappointing national report card. *Education Next, (3)*5. Retrieved from http://search.ebscohost.com.ezproxylocal.library.nova.edu/login.aspx?direct=true&db=edsgao&AN=edsgcl.544779955&site=eds-live

Wexler, J., Vaughn, S., Edmonds, M., Reutebuch, C.K. (2008). A synthesis of fluency interventions for secondary struggling readers. R*eading and Writing: An Interdisciplinary Journal, 2008 (21)*, 317–347.

Willingham, D. & Price, D. (2009). Theory to practice: Vocabulary instruction in community college developmental education reading classes: What the research tells us. *Journal of College Reading and Learning, 40*(1), 91-105.

Wood, J. (2001). Can software support children's vocabulary development? *Language Learning & Technology, 5*(1), 166-201.

Wouters, P., & van Oostedrop, H. (2013). A meta-analytic review of the role of instructional support in game-based learning. *Computers & Education, 60*(1), 412-425.

Xin, J. F., & Rieth, H. (2001). Video-Assisted vocabulary instruction for elementary school students with learning disabilities. *Information Technology in Childhood Education Annual,* (1), 87-103.

Yborra, R., & Green, T. (2003). Using technology to help ESL/EFL students develop language skills. *The Internet TESL Journal*, *9*(3). Retrieved from http://iteslj.org

Yopp, H. K., & Yopp, R. H. (2006). Primary students and informational texts. *Science and Children, 44*(3), 22-25.

Yu, C., & Smith, L.B. (2007). Rapid word learning under uncertainty via cross-situational statistics. *Psychology Science, 18*(5), 41-420. doi:10.1111/j.1467-9280.2007.01915.x

Zhao, X., & Zhu, L. (2012). Schema theory and college English reading teaching. *English Language Teaching, 5*(11), 111-117. Retrieved from http://dx.doi.org/10.5539/elt.v5n11p111

Zugel, K.M. (2009). *The effects of reading fluency on comprehension*. Retrieved from https://eric.ed.gov/?q=the+effects+of+reading+fluency+on+comprehension&id=ED507676

Appendix A

Vocabulary Assessment-Resources

Vocabulary Assessment-Resources

ACHIEVE3000	FREERICE
The Annexation quell, reinstate, successor, imperialism	Quell (level 35)
Men of Destiny allocate, anti-apartheid, appalled, atone, boycott, cohort, philosophical, rescind, resonance	Atone (level 34) Cohort (level 25) Rescind (level 34)
Right on the Money constraint, frugal, incorporate, recession, severity	Frugal (level 34)
Camp Like You've Never Seen It! daunting, deteriorate, lavish	Daunting (level 34)
Where Dreams Were Put On Hold commentary, disdainful, evoke, interrogation	evoke (level 34)
Lessons from the Cold War affiliation, aftermath, alleviate, capitalist, characterize, concoct, convert, devastating, dilemma, delusional, dissident, erode, fidelity, ideology, interrogator, protracted, psychological, variance	Alleviate (level 34)
Keeping a Language Alive afford, converse, crucial, indigenous, repository	Converse (level 35) Indigenous (level 28)
911.What's Your Emergency	

compassionate, crucial, facilitate, protocol, prudent	facilitate (level 33)
Look at This**!** chronic, evaluate, interpersonal, geriatric, doctorate	Chronic (level 26)
Through the Lens of Cancer devastating, diagnosis, disease, prevalent	Prevalent (level 23)
Printing Hope Initiative, orthopedist, prosthesis	Initiative (level 31)
Women Who Led the Way adversity, bona fide, resonate, adherent	Adversity (level 36) Resonate (level 31) Adherent (level 29)
The Rosewood Problem desertification, distraught, lobby, resonant	Resonant (level 31)
Our Great Migration demographic, metropolis, segregated, terminus, vibrant, vie	Metropolis (level 13)

A Soldier's Message of Hope: indigenous, inhumane, persevere, rampant, reconciliation, subsist	Indigenous (level 25) Inhumane (level 12) Reconciliation (level 20-reconcile)
These Agents Have You Covered! Ethics, liability, malpractice, mandatory,	Liability (level 10-Liable)

solicit	
Walmart Not Welcome in India? acquisition, apprehension, colleague, exponentially, unviable	Acquisition (level 24)
Tree Doctors arboretum, botanical, deficiency, dexterous, susceptible	Deficiency (level 16)
Women Who Led the Way adversity, bona fide, resonate	Adversity (level 36) Resonate (level 31)
Taj Mahal Turning Green artisan, distraught, elongated, exasperation, mausoleum	Elongated (level 16) Artisan (level 15)
Busy, Busy Cities Metropolitan area, stagnate, tranquil	tranquil (level 14)
The New ASMIO Cognitive, erratic, facilitate, linguistic, magnitude, radiation, tsunami	Magnitude (level 13) Facilitate (level 33) Erratic (level 9)
12 Years Old and in College academia, emphatically, prodigy	Emphatic (level 32-emphatically)
A Worthy Workout Chromosome, cognitive, regimen, therapeutic, transition	Cognitive (level 30)

Appendix B

Freerice Vocabulary List

Freerice Vocabulary List

LEVEL	WORD	DEFINITION

Appendix C

Student Example of Freerice

Student Example of Freerice

FREE RICE VOCABULARY LIST

LEVEL	WORD	DEFINITION
16	Spite	Malice
16	Statuesque	Grand
17	Dishearten	Demoralize
17	Increment	Increase
18	Chivalric	Gallant
18	Backlash	Repercussion
18	Sleazy	Squalid
19	Deject	Dishearten
19	Blot	Stain
19	Plurality	Multitude
20	Miserly	Stingy
19	Precursor	Forerunner
19	Sentiment	Opinion
19	Plotter	Conspire
20	Disposition	Temperament

Appendix D

Vocabulary Assessment & Answer Key

Vocabulary Assessment & Answer Key

VOCABULARY ASSESSMENT

Directions: Choose/circle the correct definition for each of the words listed below.

1. Quell
   a. prompt
   b. subdue
   c. bargain
   d. gape

2. Atone
   a. spoil
   b. compensate
   c. evoke
   d. reinstate

3. Rescind
   a. cancel
   b. distraught
   c. variance
   d. subsist

4. Frugal
   a. thrifty
   b. infamous
   c. dominance
   d. erode

5. Daunting
   a. scare
   b. crowding
   c. valuable
   d. lacking

6. Evoke
   a. induce
   b. ignore
   c. ideology
   d. variance

7. Alleviate
   a. worsen
   b. depress
   c. lessen
   d. particular

8. Converse
   a. same
   b. distraught
   c. procure
   d. opposite

9. Facilitate
   a. aid
   b. allocate
   c. negotiate
   d. boycott

10. Chronic
    a. designate
    b. lavish
    c. literally
    d. incurable

11. Prevalent
    a. infuse
    b. liability
    c. mandatory
    d. widespread

12. Initiative
    a. ambition
    b. laziness
    c. protractor
    d. spurn

13. Adversity
    a. good luck
    b. sassy
    c. bad luck
    d. premise

14. Cohort
    a. enticement
    b. associate
    c. daddy
    d. news

15. Metropolis
    a. addiction
    b. forgetfulness
    c. city
    d. detention

16. Reconcile (reconciliation)
    a. extrude
    b. remove
    c. settle
    d. glide

17. Liable
    a. traumatic
    b. responsible
    c. slightly open
    d. insubstantial

18. Acquisition
    a. gain
    b. naysayer
    c. weirdo
    d. airship

19. Deficient (deficiency)
    a. sneezing
    b. pessimistic
    c. deranged
    d. lacking

20. Elongated
    a. lengthened
    b. shortened
    c. palsy
    d. rampart

21. Adherent
    a. trounce
    b. follower
    c. skillful
    d. bloodline

22. Resonate
    a. skinflint
    b. bard
    c. direful
    d. resound

23. Tranquil
    a. merciful
    b. poor
    c. high quality
    d. calm

24. Artisan

a. craftsperson
b. ruly
c. scarab
d. till

25. Inhumane

a. evaluate
b. designate
c. brutal
d. Lavish

26. Erratic

a. regular
b. unpredictable
c. secluded
d. Solicit

27. Indigenous

a. patronizing
b. legendary
c. reinstate
d. native

28. Emphatically (emphatic)

a. widespread
b. quiet
c. definitely
d. burnish.

29. Cognitive

A. regimen
B. mental
C. mandate
D. imply

30. Magnitude

a. importance
b. hoodwink
c. trivial
d. boast

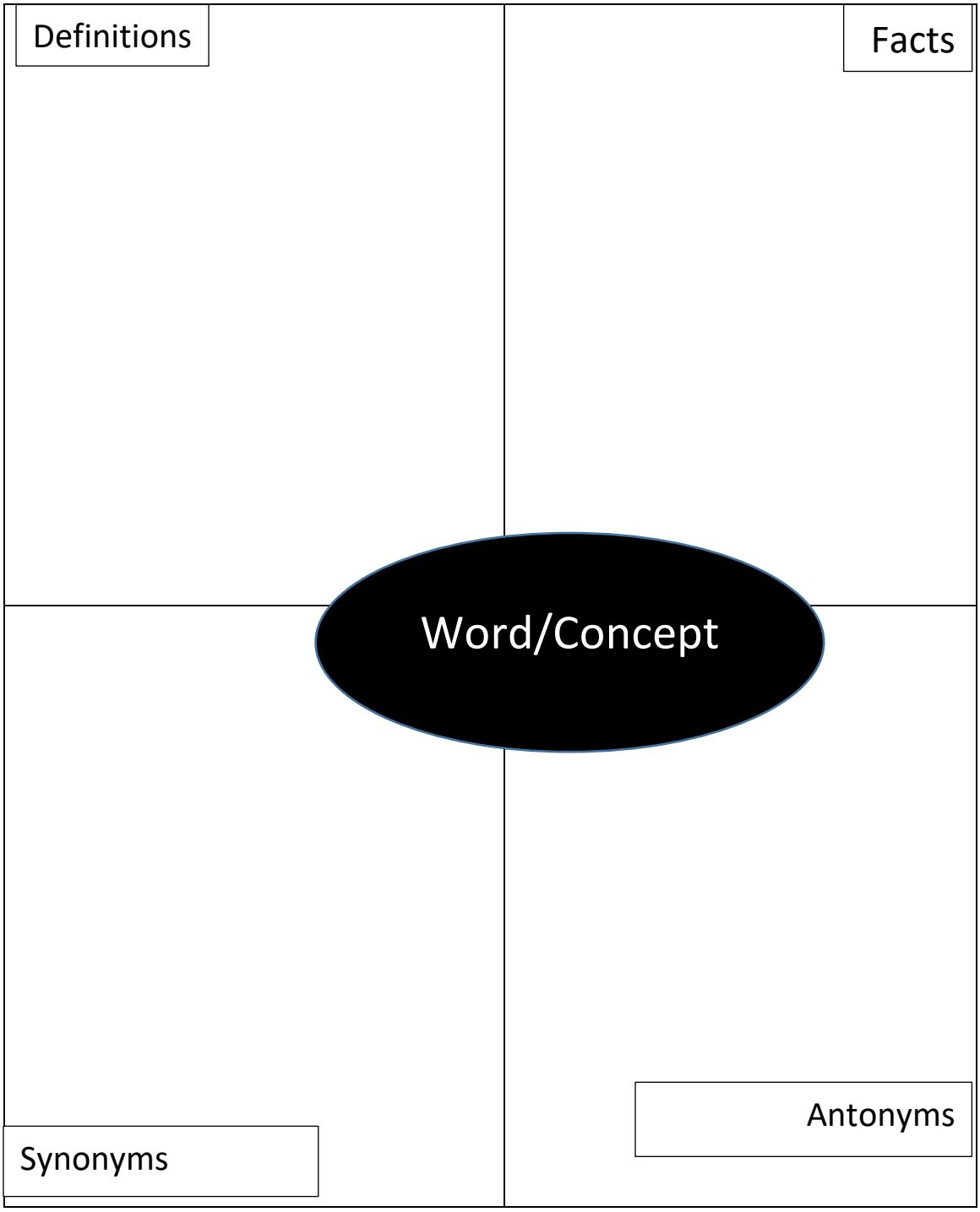
Answer Key-Vocabulary Assessment

1. B
2. B
3. A
4. A
5. A
6. A
7. C
8. D
9. A
10. D
11. D
12. A
13. C
14. B
15. C
16. C
17. B
18. A
19. D
20. A
21. B
22. D
23. D
24. A
25. C
26. B
27. D
28. A
29. B
30. A

Appendix E

Frayer Model

Frayer Model



Appendix F

Student Samples

Frayer Model (Student Sample)

Sample Student Vocabulary Sheet

Vocabulary-Week 1

1. **Quell**
2. **Atone**
3. **Rescind**
4. **Frugal**
5. **Daunting**
6. **Evoke**
7. **Alleviate**
8. **Converse**
9. **Facilitate**
10. **Chronic**

1. satisfied

2. Make amed

3. reduce

4. truthfully don't know

5. big, terrifying

6. take away

7. fix, gets better

8. talking in conversation

9. take care of

10. menta disorder, or, extreme pain

Appendix G

Gates MacGinitie Reading Comprehension Test (GMRT)

Sample Assessment Question

Gates MacGinitie Reading Comprehension Test (GMRT)

Sample Assessment Question

Comprehension- Level 4

The Asante is one of many peoples in Africa.

The Asante trace their family roots through their mothers. In many Asante villages, all of the villagers are related to the same female ancestor. The head of the village is the eldest male relative of that ancestor.

In the United States, a person's most important male relative is often his or her father. For an Asante, the most important person is his or her mother's brother. In fact, Asante boys often live with those uncles. When an Asante man dies, his wealth goes to his sister's sons, not his own sons.

In many Asante villages, all the women are

A) wealthy

B) important

C) related to each other.

D) from another village.

Appendix H

Letter of Agreement for Using Gates-MacGinitie Reading Test (GMRT) in Study

Letter of Agreement for Using Gates-MacGinitie Reading Test (GMRT) in Study

One Pierce Place Suite 900 W, Itasca, Illinois 60143

January 11, 2019 ID: 011119A

Nova Southeastern University
3301 College Avenue
Fort Lauderdale, Florida 33314
Deborah Ashraf
da29@mynsu.nova.edu
352-278-8610

Riverside Assessments, LLC (the legal name of Riverside Insights™, the former assessment portfolio of
Houghton Mifflin Harcourt) is happy to offer permission to use the Gates-MacGinitie Reading Test, Form S, Reading Comprehension Test, Levels 10-12, as a measuring tool to measure reading comprehension (per/post) among the students in the applied research study.

The permission granted is non-exclusive and is not transferable to other persons or to institutions. It is requested, that upon completion, a copy of your research results shall be forwarded to Donetta Forsyth at Riverside Insights, One Pierce Place, Suite 900W, Itasca, Illinois 60143 or donetta.forsyth@hmhco.com

Thank you for your interest in the *Gates-MacGinitie Reading Test® (GMRT®)* This letter is in response to your recent request for use of these materials in your research project entitled *"Investing the use of Webbased Vocabulary Acquisition Programs as a Tool to Strengthen Vocabulary Skills for 11th and 12th Grade Students".*

This agreement will expire July 31, 2019.

Credit for the use of the material will be given as follows:

> "*Gates-MacGinitie Reading Test® (GMRT®)* by the Riverside Assessments, LLC. Used with permission of the publisher. All rights reserved."
>
> **No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recorded or by any information storage or retrieval system without the proper written permission of the Riverside Assessments, LLC unless such copying is expressly permitted by federal copyright law:// Address inquiries to: Donetta Forsyth % Riverside Insights, One Pierce Place, Suite 900W, Itasca, Illinois 60143.**

Sincerely, Donetta Forsyth

Donetta Forsyth
Contract Administrator