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Measuring The Effect Of Vocabulary Instruction On Reading Comprehension: Comparing Students Of Lower And Higher Socioeconomic Status

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MEASURING THE EFFECT OF VOCABULARY INSTRUCTION ON READING COMPREHENSION: COMPARING STUDENTS OF LOWER AND HIGHER SOCIOECONOMIC STATUS

By:

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This thesis meets the standards for appearance, conforms to the style and format requirements of the Graduate School of the University of North Dakota, and is hereby approved.

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Michelle Burns
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ABSTRACT

This study examined the effect of a lexicon enhancement program on students categorized as lower SES, determined by whether or not they qualified for the federal free or reduced lunch program. Specifically, the performance of lower SES students on measures of vocabulary learning and reading ability were compared to classmates who did not qualify for the federal program (higher SES). Forty-six 4th grade students from the Grand Forks Public School district participated in the study. Students from the lower SES and higher SES group were randomly assigned by classroom to be either in the intervention or the control group, with the intervention group receiving vocabulary instruction of either academic or tier II words through a lexicon enhancement program. Student's vocabulary knowledge was assessed using the *Zero-One-Two* (Robinson, 2013). Reading knowledge and vocabulary knowledge were compared using the *Measures of Academic Progress* (*MAP*), a standardized, computerized test. Results revealed that there were no significant differences between the two SES groups on the Vocabulary and Reading RIT of the *MAP* test. Significant differences did exist on the *Zero-One-Two* between the intervention and control group, {F (1,4) = 8.08, p = .01, power = .55}, Vocabulary RIT of the *MAP* {F (1,4) = 4.135, p = .05, power = .51}, and the Reading RIT of the *MAP* {F (1,4) = 8.42, p = .01, power = .81}.

CHAPTER I

INTRODUCTION

Having a strong vocabulary has been linked with success in multiple areas, especially reading. Students need strong receptive (comprehension) and expressive (production) vocabulary knowledge to become strong readers (Jalongo & Sobolak, 2011). Reading, specifically reading comprehension, impacts almost all areas of education. Gray and Yang (2015) stated that vocabulary knowledge plays an important role in the ability to understand both spoken and written sentences and it is likely that students who have low oral vocabulary knowledge will also have poor reading comprehension skills.

Vocabulary has been defined as a collection of words in which an individual can recognize and derive meanings from in either written or spoken language (Beck, McKeown, & Kucan, 2008). Vocabulary can be categorized into two units, receptive and expressive. Receptive vocabulary is speech perception and expressive language is speech production (Richter, Eißele, Laszig, & Löhle, 2002).

Vocabulary knowledge is important for many academic and social aspects of life. It has been stated that vocabulary is one of the most important aspects of an educated student (Beck, McKeown, & Kucan, 2002). An individual's vocabulary and personal lexicon affect how they are able to speak, write, and understand oral and written texts. Without strong vocabulary knowledge a student may to struggle in multiple areas of education, including

reading comprehension, which has been directly linked with vocabulary knowledge (Beck & McKeown, 2007; Hairrell, Rupley, & Simmons, 2011; Sobolak, 2011; Quinn, Wagner, Petscher, & Lopez, 2015).

Since poor reading comprehension is a strong predictor of poor vocabulary knowledge, poor readers would arguably benefit from vocabulary instruction. Researchers have also suggested that reading impacts almost all aspects of education and is important for academic success. In summary, research has shown that if a student does not have a strong vocabulary, he or she will have poor language comprehension and reading skills, which will negatively impact all other areas of education (Jalongo & Sobolak, 2011).

Although recent literature shows that vocabulary knowledge is important for academic success, the caliber of vocabulary instruction in schools often is not sufficient enough for students to learn new words. Results from a survey in 2008 showed that teachers and reading specialists felt vocabulary instruction was important, but were concerned that their buildings and districts had no system-wide method to teaching vocabulary (Berne & Blachowicz, 2008). This finding supports the idea that a systematic method to teach vocabulary is needed within school districts.

Not only do typical students have trouble learning these vocabulary words, but studies have shown that students with language disorders have trouble with word learning and need to hear a word twice as many times as a student with average language abilities (Komesidou & Storkel, 2015; Zipoli, Coyne, & McCoach, 2012). The fact that students with language disorders face more difficulties than the average student strengthens the need to develop a systematic method to teach vocabulary effectively.

Research in the area of reading comprehension and how to improve reading

comprehension is needed (Beck & McKeown, 2007). A recent article states that more collaborative research is needed between university speech-language pathologists, school-based speech-language pathologists, and classroom teachers on implementation of evidence-based treatment programs in real-life settings, such as in the school setting (Nippold, 2015). Specifically, studies are needed that investigate strategies to improve the reading comprehension skills in school-aged children (Hairrell, Rupley, & Simmons, 2011). One past study revealed that students with reading difficulties benefited three times as much while receiving vocabulary instruction than students who were not receiving explicit vocabulary instruction (Hairrell, Rupley, & Simmons, 2011).

Profound differences have been documented in the amount of vocabulary words known between students of high and low socioeconomic status (SES). Researchers have discovered that low SES students scored .5 - 1.5 standard deviations below average when compared to the normative data (Spencer & Schuele, 2012). These differences are present in toddlers to high school students (Beck & McKeown, 2007). Students of lower SES have also been shown to develop language slower than same-aged peers (Sobolak, 2011; Spencer & Schuele, 2012). Beck and McKeown (2007) stated that first grade students of higher SES knew at least double the amount of vocabulary words as students of lower SES. If students are not directly taught vocabulary words they may be able to learn the words through extensive reading. Students from a lower SES are typically poorer readers when compared to students of higher SES (Beck & McKeown, 2007), meaning they will have more difficulty acquiring the needed vocabulary from reading to be successful academically.

The current study was designed to study the effects of classroom based vocabulary instruction. The following questions will be addressed:

1. Is there a difference in the number of words learned between students of lower and higher socioeconomic status in the fourth grade?

2. Is there a difference in the amount of general vocabulary abilities in lower versus higher socioeconomic students?

3. Is there a difference in the reading comprehension scores in lower versus higher socioeconomic students?

CHAPTER II

REVIEW OF LITERATURE

Importance of Vocabulary Instruction

Vocabulary has been defined as a collection of words in which an individual can recognize and derive meanings from in either written or spoken language (Beck, McKeown, & Kucan, 2008). Vocabulary can be divided into two categories, receptive and expressive. Receptive vocabulary is the comprehension of words and expressive vocabulary is the production of words (Richter, Eißele, Laszig, & Löhle, 2002). Each individual's vocabulary is distinct and, for this reason, can be referred to as that individual's personal lexicon. An individual's vocabulary and personal lexicon affect how they are able to speak, write, and understand oral and written texts.

Vocabulary knowledge is important for many academic and social parts of life. It has been stated that vocabulary is one of the most important aspects of an educated student (Beck, McKeown, & Kucan, 2002). Without strong vocabulary knowledge, a student may struggle in multiple areas of education. Reading comprehension specifically, has been directly linked with vocabulary knowledge (Beck & McKeown, 2007; Hairrell, Rupley, & Simmons, 2011; Sobolak, 2011; Quinn, Wagner, Petscher, & Lopez, 2015).

The simple view of reading (Gough & Tunmer, 1986) explains reading comprehension as two parts. Decoding is the skill that is required for individuals to understand how sounds correlate with letters to be able to "sound out" words while reading. Linguistic comprehension is the knowledge of language to understand the meaning of words

while reading and includes the structure of language (grammar, word order) and the meaning of language (vocabulary, concepts, slang). An individual needs to be able to integrate both of these abilities and cannot have one skill without the other to become a strong reader. In the early elementary years, students rely more heavily on their decoding skills to make meaning out of text. In the higher elementary years, students switch to relying on stored language knowledge in order to comprehend the more abstract nature of academic texts. In order for students to effectively use linguistic comprehension, they must also have a sufficient vocabulary. An example of integrating both skills would be if a student can recognize the word "vanish" but does not understand that it means "to disappear," the word will have no value to the student and will, therefore, impact comprehension. The National Institute of Child Health and Human Development (2000) published the *Report of the National Reading Panel* which stated that there is a relationship between vocabulary and learning to read. The researchers also found that poor vocabulary knowledge contributes to poor reading and therefore difficulty with learning.

To support the idea that vocabulary knowledge affects reading comprehension, the National Assessment of Educational Progress (NAEP) reported in 2013 that children with the highest reading scores also had the highest vocabulary scores. In addition, students who scored in the lowest 25% in reading comprehension also scored in the lowest 25% in vocabulary. These findings suggest a correlation between reading and vocabulary demonstrating that students need vocabulary knowledge to become proficient readers.

Oullette and Harris (2006) conducted a study to examine the relationships between vocabulary (receptive and expressive), depth of vocabulary knowledge, decoding, visual word recognition, and reading comprehension. Several standardized and nonstandardized

measures were administered to explore the relationship between the variables. The measures given included: the *Test of Nonverbal Intelligence - Third Edition* (Brown, Sherbenou, & Johnsen, 1997), four sections (receptive vocabulary, expressive vocabulary, word definitions, and synonyms) of the *Test of Word Knowledge* (Wiig & Secord, 1992), the *Word Attack* (decoding) and *Reading Comprehension* subtests of the *Woodcock Reading Mastery Tests—Revised* (Woodcock, 1998), and participants were asked to read aloud from a word list composed of 47 words that became progressively more difficult. The purpose of the word list was to assess visual word recognition. Forty-seven 4th grade students' scores were analyzed in the study. The results from the study found that depth of receptive and expressive vocabulary knowledge were strongly correlated (*Pearson's r* = .504) with reading comprehension skills. Receptive vocabulary breadth and expressive vocabulary breadth were moderately correlated (*Pearson's r* = .484 and *Pearson's r* = .36, respectively) with reading comprehension skills, as well. These results suggest that the greater the extent of vocabulary word knowledge a student has (i.e., depth) and the greater the amount of vocabulary words a student knows (i.e., breadth), the better that student's reading comprehension skills will be (Ouellette & Harris, 2006).

With an increase in vocabulary research and knowledge about the correlation between reading proficiency and vocabulary knowledge, one would expect vocabulary scores to be increasing; however, this is not what the data reveals. Within the state of North Dakota, the results from the NAEP (2015) revealed that reading scores have remained relatively stagnant since 2002 in both fourth and eighth grade, which falls in line with the national average. This suggests that either the current methods to teach vocabulary are not effective or that vocabulary is not being systematically taught.

What Words to Teach

Vocabulary knowledge is important and plays a role in overall academic success. Given this knowledge, the question becomes, what vocabulary words should teachers target for the greatest impact on academic success? Some researchers believe that academic words should be targeted during vocabulary instruction because students need to be able to use these words to communicate and think about academic subject areas (Nagy & Townsend, 2012; Townsend, Filippini, Collins, & Biancarosa, 2012). Others believe tier II words should be used because they are words that are not learned through everyday interactions and are needed for comprehension (Beck, McKeown, & Kucan, 2013).

The English language contains thousands of words, but not all words and word meanings need to be taught directly. Some words are learned through natural experiences, such as book, house, and cat, while others require direct instruction, for example, vanish and circumference. Some words appear frequently in oral and written language, thus providing a learner with multiple exposures, while others only appear in certain contexts. One way to categorize English words is by the frequency of occurrence. Beck, McKeown, & Omanson (1987) divided vocabulary words into three categories, or tiers. Tier I words are words that children learn in everyday interactions and require no explicit teaching. For example, students will learn the word "horse" by hearing others use the word when talking about the farm animal or by watching someone point to and label a picture of a horse in a storybook. Tier II words are considered to be uncommon in conversation, but are common in academic readings and require more explicit teachings. This means that a student may not learn these words through typical, nonacademic reading tasks or daily interactions with peers and adults independently. They will require some type of instruction to learn tier II words, understand

the words while reading, and use them in conversation. An example of a tier II word would be “assume,” meaning, “To think without proof.” Students in elementary school would likely not learn the meaning of “assume” without some type of instruction because it is abstract and does not have a direct referent to it. Tier II words are essential for comprehension as they appear frequently in oral and written language. Tier III words are the most abstract and are domain-specific. This means that these words are used in particular subject areas. Tier III words are usually only taught in certain contexts; for example, a science teacher will typically provide direct instruction for the meaning of the word “mitochondria” in an upper-level science class. Beck, McKeown, and Kucan (2013) believe that tier II words should be directly taught to students because they are words that appear frequently in written and oral language, are not explicitly taught, and are essential for comprehension.

Coxhead (2000) developed a specific subset of tier II words, called academic words and combined these words to form the Academic Word List (AWL). The AWL consists of 570 frequently occurring English word families. A word family consists of the root word, regular inflections of the word, and derivations of the word; for example, inspire, inspiring, inspired, inspires, and inspiration. To develop the AWL, Coxhead used the Academic Corpus, developed by Davies (1990), as a running vocabulary list. The Academic Corpus contains approximately 3.5 million words that were collected from over 400 written materials that first-year university students were required to read. These words were discovered in a wide range of academic texts of various subject areas. They were divided into four main disciplines: arts, commerce, science, and law. The words were further divided into seven separate subject areas for each discipline for a total of twenty-eight subject areas. Coxhead used three principles to determine which words from the Academic Corpus would be

included in the AWL. First, the word family had to occur in all four of the disciplines of the Academic Corpus and in more than half of the twenty-eight subject areas. This ensured that the AWL would be useful for all learners regardless of their area of study. Second, the word family had to occur more than 100 times in the Academic Corpus to ensure that each word family occurred frequently in academic texts. Finally, the word family had to occur in each of the four disciplines at least ten times to, again, ensure that the AWL would be useful for all learners. The 2,000 most frequent words of English, proper nouns, and Latin forms were excluded from the AWL. It is estimated that 10% of all words in academic texts are made up of words from the AWL (Coxhead, 2011).

Given the fact that these words occur frequently in academic texts and contribute to the abstractness of such texts (Townsend, Filippini, Collins, & Biancarosa, 2012), it could then be argued that academic words from the AWL should be targeted in vocabulary instruction. Coxhead's list of word families makes it easier to determine which academic words should be taught in order to make the largest impact in multiple academic areas (Nagy & Townsend, 2012). While word selection is an important part of vocabulary instruction, it is only one step needed to successfully teach vocabulary. It is equally important to use evidence-based methods of vocabulary instruction to create an effective program (Gray & Yang, 2015).

What Method to Use

Across the nation, many different methods of teaching vocabulary are used. Common methods include using reading curriculum, spelling lists, and simply looking up the definitions of unknown words in a dictionary. Beck, McKeown, and Kucan (2013) found that using a dictionary is not useful and it is more useful to use child-friendly explanations and to

get the student to actively use the word themselves when speaking or writing. This finding is related to other findings that state that a student needs to hear vocabulary words multiple times and have the experience of practicing the words to be able to comprehend them (Nagy & Townsend, 2012).

There are multiple theories related to how children learn vocabulary. Three of the main theories include the process learning approach, cognitive vocabulary approach, and the context-driven approach. The process learning approach views vocabulary development as a two-step process. The first step is learning from input and the second step is memory evolution in the absence of input (Komesidou & Storkel, 2015). For example, first students are taught vocabulary words through writing. Then the writing is taken away and the student must remember that vocabulary word from memory alone. A major component of the process learning approach is lexical engagement, which involves building connections (orthographically, phonologically, and through meaning) between the new vocabulary word and words that are already in the student's repertoire (Leach & Samuel, 2007).

The cognitive vocabulary approach involves teaching students the metacognitive skills needed to identify words they do not recognize and draw connections to other experiences and vocabulary words (Harmon, Buckelew-Martin, & Wood, 2010). Metacognitive skills include higher level thinking tasks such as actively monitoring comprehension and planning how to complete a given task. After the students independently identify words that are unfamiliar to them, the class then determines which words were most commonly identified and focuses on those words for instruction.

A study conducted by Lubliner and Smetana (2005) examined the effects of implementing the cognitive vocabulary approach to fifth-grade students in a low-performing,

Title 1 school for a 12-week period. Each of the participating classrooms completed 12 modules, with one to three lessons each, using the school district's social studies textbook. The goal of the intervention was to increase the students' metacognitive skills, therefore, improving their vocabulary knowledge. Each lesson was focused on a specific strategy to improve the students' vocabulary skills through metacognition. Examples of lessons to increase metacognition included teaching students to read aloud, rating their knowledge of unknown words, and coloring unknown words red. During the lesson the teacher modeled the targeted strategy and provided opportunities for the students to practice the newly learned method. After each lesson, when the students became more comfortable, the students used their newly acquired strategy while reading their social studies textbooks with a partner. Next, the class engaged in a whole-group discussion centered on the strategy targeted that week.

Students were evaluated three times (pretest, interim test, and posttest) using three measures. The first measure was a metacognitive test where the students were asked to read a difficult social studies passage and highlight words they did not know. This measure was designed to determine the percentage of unknown words between intervention periods. The second and third measures were a reading comprehension and vocabulary acquisition test. The students were instructed to read a social studies text at the ninth grade level and then answer 30 comprehension questions and 20 vocabulary questions. The vocabulary questions were developed from words in the passage that the researchers thought would be unknown to the students. Students at an above average performance school within the same district were also tested as a control for the study.

The pretest data revealed significantly higher scores on the reading comprehension and vocabulary acquisition tasks for students in the control group than students in the intervention group. By the end of intervention, the posttest data revealed that the differences between groups were nonsignificant suggesting that teaching students vocabulary using a cognitive approach does help students in the areas of reading comprehension and vocabulary acquisition (Lubliner & Smetana, 2005).

The context-driven approach involves identifying unknown words within the context of written text, typically through storybooks. Similar to the cognitive vocabulary approach, children are taught the skills to identify words they are not familiar with, but the word that is targeted has been predetermined. A majority of context-driven studies are designed for a classroom teacher to implement and last from 18 weeks to the entire academic year. The targeted vocabulary words are typically tier II words which occur frequently in everyday interactions, but are not explicitly taught (Apthorp, 2006; Loesch, 2015). Most of the core studies have found positive results in using a context-driven approach to vocabulary instruction (Gonzalez et. al, 2014; Loesch, 2015).

Loesch (2015) examined the effect of vocabulary learning using a context-driven approach. Two kindergarten classrooms participated in the study. The teacher of the first classroom implemented the context-driven approach by teaching students to monitor their comprehension of unknown words, to rate their knowledge of words, and to define words using a word web. The teacher of the second classroom taught vocabulary through shared reading of a book and by explaining the meaning of the word to the students. Thirteen academic words were selected by the researcher to be targeted through children's picture books (one word per book). Both classrooms were provided a list of the target words and

books that contained these words. During instruction, each classroom teacher introduced the target word on the first day of each week by reading a story aloud that contained the word. Then, each teacher implemented the approach they were taught. Both teachers were also instructed to review the word meanings daily for the remainder of the week.

The intervention lasted fifteen weeks with one word being targeted per week and two weeks of review. Before instruction began, all participants were administered a pretest of the *Zero-One-Two* (*ZOT*; Robinson, 2013). During the pretest, participants were asked to define each target word and use the word in a sentence. They were given a score of 0-2 for each definition and each sentence provided, for a total of four points. Following the 15 weeks of instruction, all participants were administered a posttest of the same measure.

The participants' pre- and posttest *ZOT* scores were obtained for the targeted words. Loesch found that students in the first classroom knew more academic words than the second classroom as measured by pre- and posttest data (Loesch, 2015). The results were found to be significant ($p < .001$). This study suggests that kindergarten students learn vocabulary words more successfully through more structured and interactive instruction like the context-driven approach as compared to other traditional methods. The current study will focus on exploring the lexicon enhancement program, which is a context-driven approach.

Why Target 4th Grade

When students enter the fourth grade, the academic demands for reading change. Before the fourth grade, students are taught to use decoding skills because they are learning to read. At the fourth grade level, teachers are no longer teaching decoding skills, but are instead focusing on using vocabulary for language comprehension skills. Fourth grade students must be able to read in order to learn about academic subjects. The switch comes in

the fourth grade because the language presented to students in conversation and textbooks becomes increasingly more complex at this age (Nagy & Townsend, 2012).

All grade school levels teach vocabulary in some way. As a student gets older, the vocabulary demands increase. For example, according to the Common Core State Standards, fourth grade students are expected to read and comprehend challenging informational material contained in textbooks that are used to teach the various academic subjects (Nippold, 2015). Due to these standards, the *Measures of Academic Progress* (*MAP*) begins measuring vocabulary in the fourth grade.

CHAPTER III

METHODOLOGY

Participants

Fourth grade students at Viking Elementary School and Kelly Elementary School served as participants for the study during the 2015-2016 school year. Both schools are located within the Grand Forks Public School district (GFPS) in Grand Forks, ND. There are several variables present in the school setting that impact vocabulary knowledge and vocabulary learning. The most documented variable is socioeconomic status (SES). Students who are from disadvantaged backgrounds hear and thus use significantly fewer vocabulary words than their peers (Hart & Risley, 1995). For this reason, it was important to select two schools that were similar in SES. The GFPS provided the research team with the data showing the percentage of students receiving free and reduced lunch per school. Viking Elementary reports a rate of 18% free and reduced lunch and Kelly Elementary reports a rate of 15%. Both are considered low SES for the GFPS. Other demographic information about the students that was collected included: gender, ethnicity, grade in school, proficiency in the English language, and whether or not students were on an Individualized Education Plan (IEP) or a 504 Plan. Three fourth grade classrooms (1 academic, 1 Tier II and 1 control) from Viking and four classrooms (1 academic, 1 Tier II and 2 control) were included in all pretest and posttest procedures. The lower SES students were selected from this pool. Twenty-three lower SES students were identified from Kelly and Viking Elementary School. These students were matched based on vocabulary scores with 23 higher SES students from both of

the schools. The forty-six students either were a part of the intervention (academic and tier II classrooms) group or the control group. Twenty-four students belonged to the intervention group and twenty-two belonged to the control group. Twenty-two of the students were from Kelly Elementary School and twenty-four of the students were from Viking Elementary School.

The intervention group consisted of 24 students (male, n=12 and female, n= 14). The ethnicity of the participants in the intervention group included Caucasians (n=21), African Americans (n=2), Hispanic (n =1), and Native American (n =1). The control group consisted of 22 students (male = 11 and female = 11). The ethnicity of the control group included Caucasians (n = 17), African American (n = 1), Hispanic (n =1), and Native American (n =2). All students were proficient in English. Four students in the intervention group received services through an IEP and two students were on 504 plans. Five students in the control group received services through an IEP and one student was on a 504 plan.

Procedure

Prior to intervention, the literacy committee in the GFPS reported no systematic approach to teaching vocabulary. All teachers taught vocabulary within the context of literacy instruction, but they did not focus on specific words or categories of words to target. One class in each school was randomly assigned to the academic intervention group, in which, the teachers were instructed and trained to teach academic words. One class per school was randomly assigned to the tier II intervention group, in which the teachers were instructed to teach tier II words, and the remaining classrooms did not receive systematic vocabulary instruction and served as the control group.

The intervention groups were assigned to teach either 15 academic words or 15 tier II words depending on the group assigned. Although the academic and tier II groups were taught different words, they were both provided with the same children's books. The vocabulary words in each book were predetermined for the academic and tier II groups and both groups used the same method of vocabulary instruction, the lexicon enhancement program. The control group continued vocabulary instruction as was done prior to the study.

The lexicon enhancement program (LeEP) consists of three components: comprehension monitoring, a vocabulary knowledge scale, and word mapping. The first two components, comprehension monitoring and the vocabulary knowledge scale, were taught on the first day of the week when the classroom teacher read the story book. The third component, web mapping, was taught every day throughout the week and lasted no longer than ten minutes each day. All of the components were completed as a whole class.

During the comprehension monitoring component, students were instructed to alert the teacher when they heard a word that they did not know while listening to a story. The teacher then flagged that page in the book and all of the flagged words were discussed at the conclusion of the story. After all of the flagged words were discussed, the teacher then presented to the class the word that had been designated either as the target academic or the tier II word for that week. As a part of the whole group discussion, the teacher asked each student to rate his/her knowledge of the word using the Vocabulary Knowledge Scale (Paribakht & Wesche, 1997). This scale is based on a 1-4 rating system. Students raised their hand for a one if they had never heard the word before and had no clue what it meant; a two if they had maybe heard the word but did not know the meaning; a three if they had an idea of what the definition was; or a four if they could give the dictionary definition of the word.

The final component was word mapping on a word web. On the first day of the week, when the story was read, the students in the class wrote the target word in the middle of a white board and circled it. Then, they wrote in bubbles off of the main word to build a word web. The students in the classrooms wrote definitions, synonyms, and antonyms, each in a different color. For example, definitions were written in red, synonyms in blue, and antonyms in purple. Each day of the week, the class discussed the target word and added 3-4 additional bubbles to build onto the word web.

Outcome Measures

Zero-One-Two Assessment

The *Zero-One-Two* (*ZOT;* Robinson, 2013) is a researcher-designed, non-standardized measure used to assess students' knowledge of vocabulary words. Scoring on the *ZOT* is determined by the student's definition and sentence generation using the target word. This assessment was used as a pretest to measure students' knowledge of words prior to intervention. The *ZOT* contained 30 words, 15 words were academic and the other 15 were tier II words. In this way, the 15 non-targeted words for each group served as the control words. The *ZOT* was then re-administered as a posttest to determine word learning.

Graduate students in the Communication Sciences and Disorders department at the University of North Dakota were trained by the *ZOT* developer, in one-on-one training session, to administer the *ZOT* to students in the tiered, academic, and control groups. Testing was completed in a one-on-one setting in the hallway or other quiet space. Each administration was audio-recorded. Students were verbally presented with a target word and asked to first provide a definition and then a sentence using the target word. Two scores were obtained on the *ZOT*. The first was the *ZOT* total score (a broad measure of word learning).

To obtain the total score students' knowledge of each word was rated on a 0-4 point scale. Zero, one, or two points were earned for the definition that the student provided, and up to two points could be earned for using the target word correctly in a sentence. The total points possible ranged from 0-120. The second score obtained on the *ZOT* was the *ZOT* known score (reflects depth of word knowledge). The number of items a student scored 3 or 4 points on was referred to as the *ZOT* known score. The *ZOT* known score yields a possible range of 0-30.

Measures of Academic Progress

The *Measures of Academic Progress* (*MAP*) is a standardized, computer-based test for students in grades 2-12. The test is used to assess students' knowledge and academic abilities in a variety of subjects including math, reading, and language use. Each subject area is also broken into multiple subcategories, called RITs. For example, the reading section has RITs that include vocabulary and reading comprehension. The *MAP* test was developed by the Northwest Evaluation Association and each of the content areas on the *MAP* are customized to individual states based on that state's content standards. Each section of the test ranges from 40-50 multiple choice questions and students are allotted 60 minutes to complete each section (Wang, McCall, Jiao, & Harris, 2013). The *MAP* test is typically administered 2-3 times per year, depending on the school district. The scores that students obtain allow districts to track students' progress throughout the years and help teachers discover which areas need more instruction (Northwest Evaluation Association, n.d.).

In the current study, *MAP* Vocabulary RIT and Reading RIT scores were used as pre- and post-intervention measures of general vocabulary ability and of reading comprehension ability. Scores from the fall testing, which occurred in late September, served as the pre-

intervention scores and scores from the spring testing, which occurred in late April to early May, served as post-intervention scores. Scores were obtained from the data manager in the GFPS.

CHAPTER IV

RESULTS

The purpose of this study was to determine the lexicon enhancement program's effect on students categorized as lower SES, determined by whether or not they qualified for the federal free or reduced lunch program. Specifically, the performances of lower SES students on measures of vocabulary learning and reading ability were compared to classmates who did not qualify for the federal program (higher SES).

Data Analysis

The study was conducted in the Grand Forks Public Schools system. The data that were analyzed consisted of measures that are routinely administered by the GFPS to monitor academic achievement (*MAP* test), demographic information provided by GFPS, and the researcher-designed test of vocabulary knowledge (*ZOT*). The portions of the *MAP* test that were analyzed were the Vocabulary RIT, which is a measure of vocabulary that includes words not targeted in the intervention, and the overall Reading RIT, which is an independent measure of reading comprehension. The test scores from the *MAP* were provided to the research team by the data manger from GFPS. The *ZOT* data were collected and scored by trained graduate students and were used to determine the amount of vocabulary words learned from pretest to the posttest. Two scores were obtained on this measure, total *ZOT* score (a broad measure of word learning) and words known score (reflects depth of word knowledge).

The researcher was blind to the categorization of "lower SES" until the completion of the study. After posttest data collection was complete, GFPS identified those participants categorized as lower SES in both schools. For data analysis, there was a total of 46 participants, 24 in the intervention group and 22 in the control group.

The lower SES students were matched with peers based on their categorization as a part of a larger study (intervention or control) and then by pretest *ZOT* total scores. The *ZOT* scores were selected as the matching variable because vocabulary learning was the focus of the intervention and has been shown to be negatively impacted by lower SES (Spencer & Schuele, 2012). Table 1 below illustrates the number of students in each category that were included in the study for analysis.

Table 1. Number of participants in each group by SES status

	Intervention Group	Control Group
Lower SES	12	11
Higher SES	12	22

The Statistical Package for the Social Sciences Program (SPSS), version 23, was used for all statistical analysis. An analysis of variance (ANOVA) was conducted on all pre-test scores to determine if differences existed between the lower and higher SES groups (see Table 2). A second ANOVA was conducted to determine if pretest differences existed between the intervention and control groups prior to intervention. These results are shown in Table 3 below.

Table 2. Results of the ANOVA comparing pretest measures according to SES status

Pretest Measure	df	Mean Square	F	P Value	Observed Power
Pretest ZOT total	1	1.76	0.00	0.95	0.50
Pretest ZOT Words Known	1	1.07	0.03	0.88	0.05
Pretest Vocabulary RIT	1	469.76	2.74	0.11	0.37
Pretest Reading RIT	1	736.00	4.50	0.04*	0.55

*= $p < 0.05$

Table 3. Results of the ANOVA comparing pretest measures according to categorization of intervention or control

Pretest Measure	df	Mean Square	F	P Value	Observed Power
Pretest ZOT Total	1	2738.82	6.12	0.02*	0.68
Pretest ZOT Words Known	1	176.08	4.49	0.04*	0.55
Pretest Vocabulary RIT	1	511.31	3.00	0.09	0.40
Pretest Reading RIT	1	610.28	3.67	0.06	0.47

*= $p < 0.05$

As can be seen from Table 2, the overall Reading RIT pretest scores differed significantly between the lower and higher SES groups. The data in Table 3 reveals a significant difference on the pretest *ZOT* total score and the Pretest *ZOT* words known score between intervention groups. Due to this significant difference, an analysis of co-variance (ANCOVA) was used to compare all pre- and posttest group data for all posttest variables.

The co-variate used for each posttest was the pretest score in effort to control for the initial variance between groups.

For each variable of interest, a comparison between lower and higher SES participants and whether or not they participated in intervention were compared. Table 4 shows the descriptive statistics and results of the ANCOVAs for the posttest measures.

For each of the three variables of interest, a series of ANCOVAs were conducted because significant differences were found on pretest measures.

Table 4. A comparison of group means between lower and higher SES participants and whether or not they participated in intervention on each measure

		M			
		Lower SES Intervention (*n*=12)	Lower SES Control (*n* =11)	Higher SES Intervention (*n* = 12)	High SES Control (*n*= 11)
ZOT Total	Pretest	48.58	33.00	33.27	48.83
	Posttest	66.42	48.82	71.17	52.64
ZOT Words Known	Pretest	11.75	6.82	11.83	8.18
	Posttest	17.08	10.81	19.92	13.45
Vocabulary RIT	Pretest	198.50	189.73	205.92	199.27
	Posttest	201.17	198.18	209.92	208.55
Reading RIT	Pretest	198.25	190.82	203.08	198.00
	Posttest	200.17	190.82	211.75	208.18

Amount of Words Learned

In order to measure the amount of vocabulary growth, students' pre- and posttest *ZOT* scores were compared. This measure yields two scores. The first is a total score, with possible scores ranging from 0-120 points. The students' pretest *ZOT* total scores ranged from 1-104 and their posttest scores ranged from 10-119 total points. Figure 1 shows the comparison of the mean *ZOT* total scores.

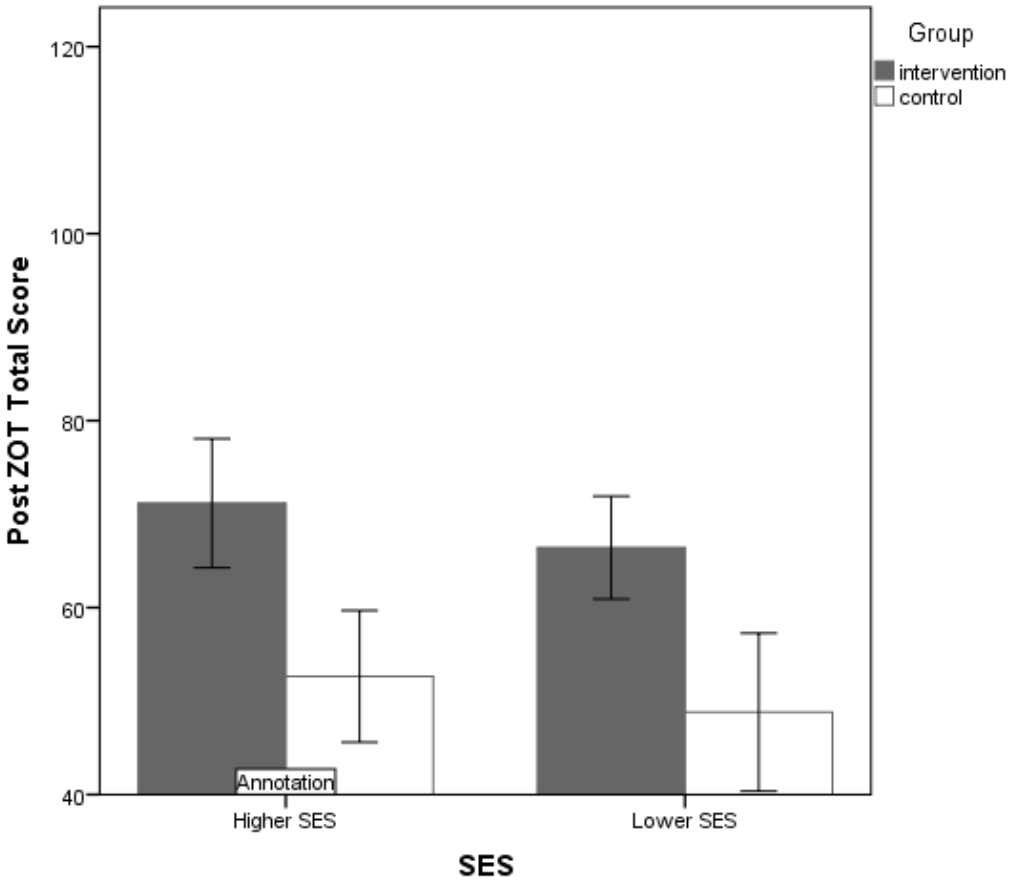

Figure 1. *ZOT* total scores by group and SES (Error bar shows ± 1 standard error)

An ANCOVA was conducted to determine if significant differences existed between the SES or intervention groups. The results, as shown in Table 5, show no significant difference between either the lower and higher SES groups or the intervention or control

groups. Further there was no significant interaction between any of the groups. As can also be seen in Table 5, these comparisons did not have sufficient power to detect significant differences. An effect size was calculated using Cohen's *d.*

Table 5. *ZOT* total scores by SES and intervention group

	df	F	P Value	Observed Power	Effect Size
SES Groups	1	0.91	0.35	0.15	
Intervention/Control Group	1	0.96	0.33	0.16	0.73

*= $p < 0.05$

To measure the amount of vocabulary words learned during intervention pre- and posttest *ZOT* total words known scores were compared. Scores on this measure can range from 0-30. Student's pre- and posttest scores are shown in Figure 2 below and were compared to student's scores in the opposite intervention or SES group using an ANCOVA. A significant difference on posttest *ZOT* words known was found between SES groups, F (1, 4) = 4.53, p = .04, power = .55. A significant difference was also found between the intervention and control group, F (1, 4) = 8.08, p = .01, power = .55.

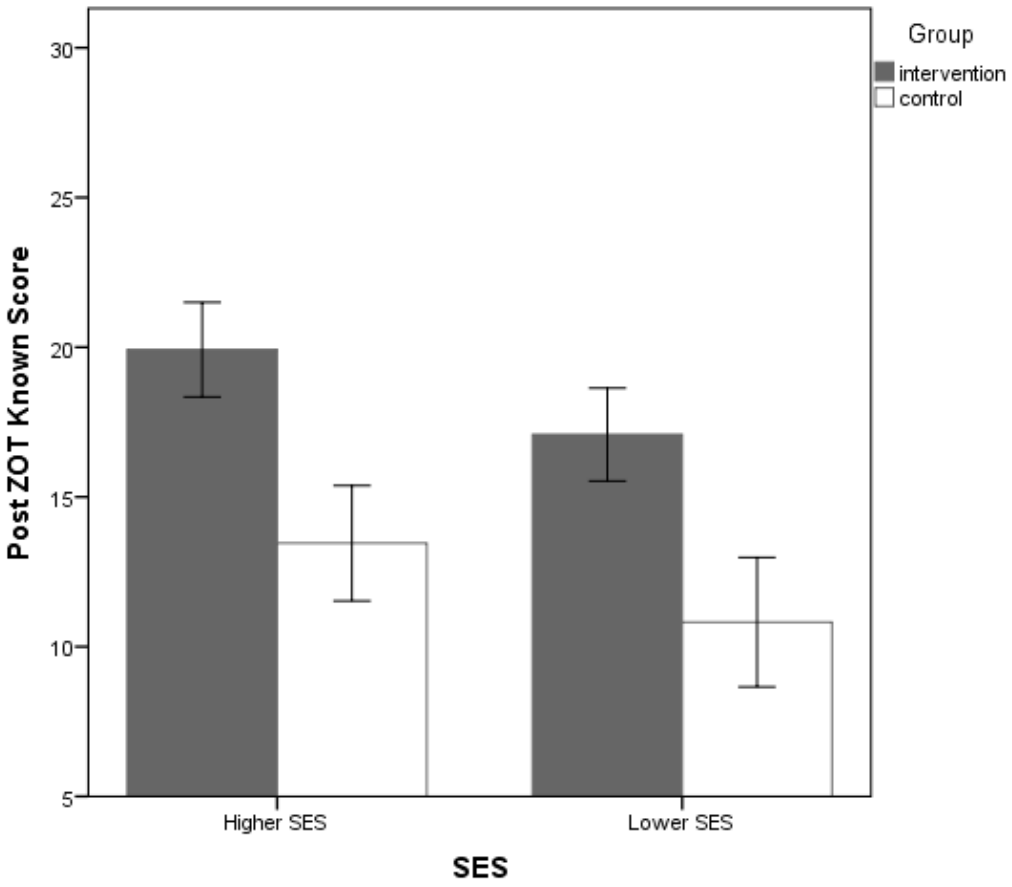

Figure 2. *ZOT* words known scores by group and SES (Error bar shows ± 1 standard error)

Table 6. *ZOT* total words known scores by SES and intervention group

	df	F	P Value	Observed Power	Effect Size
SES Groups	1	4.53	0.04*	0.55	
Intervention/Control Group	1	8.08	0.01*	0.79	0.99

*= $p < 0.05$

Differences in General Vocabulary Knowledge

To determine if socioeconomic status affected general vocabulary knowledge scores from the Vocabulary RIT of the *MAP* test were obtained. Using SPSS, the scores were analyzed using an ANCOVA. No significant difference was found between the SES groups

on the Vocabulary RIT, F (1, 4) = 1.05, p = .31, power = .17. A significant difference was found on the Vocabulary RIT between the intervention and control group, F (1, 4) = 4.14, p = .05, power = .51, Cohen's d = .16.

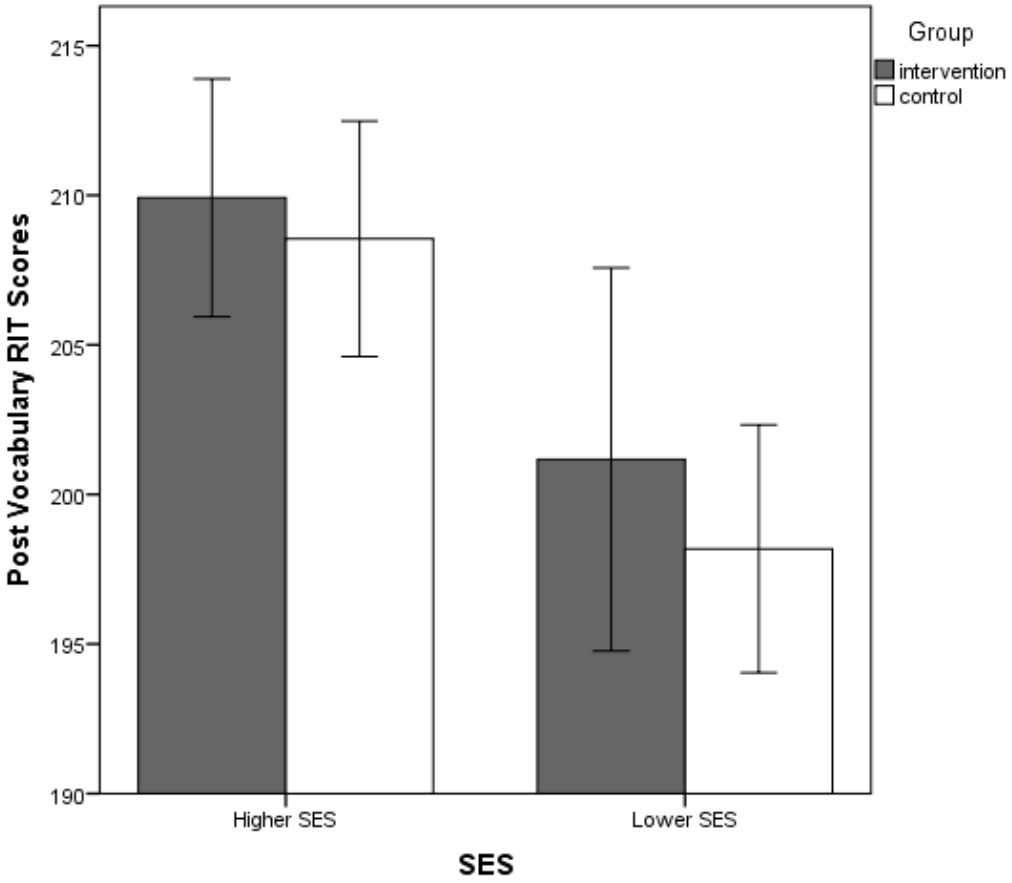

Figure 3. Vocabulary RIT scores by group and SES (Error bar shows ± 1 standard error)

Table 7. Vocabulary RIT scores by SES and intervention group

	df	F	P Value	Observed Power	Effect Size
SES Groups	1	1.05	0.31	0.17	
Intervention/Control Group	1	4.12	.05*	0.51	.16

*= p < 0.05

Differences in Reading Comprehension

An ANCOVA was conducted to compare pre-and posttest reading abilities, as measured by the Reading RIT. The posttest results revealed that there was no significant difference on the Reading RIT scores between the SES groups, F (1, 4) = .45, p = .51, power = .81. There was a significant difference on the Reading RIT between the intervention and control group, F (1, 4) = 8.42, p = .01, power = .81. This difference is illustrated in Figure 4 below.

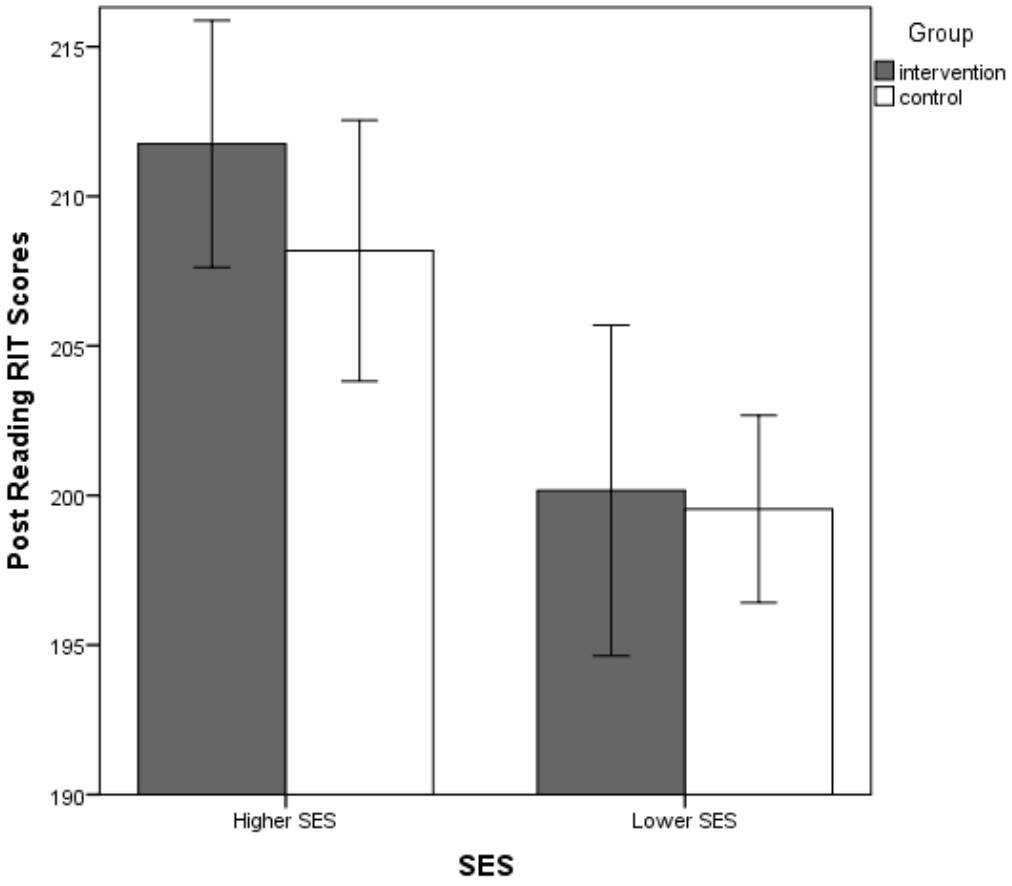

Figure 4. Student's Reading RIT scores by group and SES (Error bar shows ± 1 standard error)

Table 8. Reading RIT scores by SES and intervention group

	df	F	P Value	Observed Power	Effect Size
SES Groups	1	0.45	0.51	0.10	
Intervention/Control Group	1	8.42	0.01*	0.81	0.04

*= $p < 0.05$

Table 9. Effect size between the intervention and control groups in each measure

	ZOT Total	*ZOT* Known	Vocabulary RIT	Reading RIT
Effect Size	0.73	0.99	0.16	0.04

CHAPTER V

DISCUSSION

The aim of this study was to examine if differences existed between lower and higher socioeconomic students when using a lexicon enhancement program. Specific questions the study aimed to answer were: are there differences in 1) the number of words learned between students of lower and higher socioeconomic statuses, 2) the amount of general vocabulary abilities in lower versus higher socioeconomic students, and 3) the reading comprehension scores in lower versus higher socioeconomic students.

Amount of Words Learned

Past studies have stated that students from lower SES backgrounds typically score lower on vocabulary measures (Beck & McKeown, 2007; Sobolak, 2011; Spencer & Schuele, 2012) when compared to higher SES peers. Data showed that using the lexicon enhancement program the lower SES students learned at the same rate as the higher SES students. The data did not reveal a gap between the lower and higher SES students widening over the year, which is also suggested in the literature. The idea of a gap widening between socioeconomic classes as students get older is referred to as the Mathew Effect (Stanovich, 1986).

However, regardless of socioeconomic status, students in the intervention group learned a greater amount of words when compared to the control group. This finding suggests that the approach used to teach vocabulary was successful.

Scores on the *MAP* Measures

The results of the study show that following the vocabulary intervention, the lower and higher SES groups scored similarly on the Vocabulary RIT resulting in a nonsignificant difference between the two groups. There was a significant difference between the intervention and control groups on the posttest Vocabulary RIT. The intervention group scored higher than the control group on that measure. This finding suggests that the lexicon enhancement program does improve general vocabulary knowledge, as measured by the Vocabulary RIT, in both students of lower and higher socioeconomic statuses. This was particularly interesting because it shows that not only did the students learn the words that were directly taught to them; they were able to significantly increase their general vocabulary knowledge. Previous research (Wright & Neuman, 2013) has consistently shown improvement in researcher-designed measures, but has not been successful in showing improvements in independent measures of general vocabulary.

Following intervention students of lower and higher SES scored similarly on the Reading RIT, resulting in no significant difference between the two groups. There was a significant difference between the intervention and control groups following intervention on the Reading RIT scores. Students in the intervention group scored significantly higher on this measure. This finding suggests that students of lower and higher socioeconomic status benefit equally in the area of reading comprehension from instruction through the lexicon enhancement program. Previous studies have suggested a strong link between vocabulary knowledge and reading comprehension (Beck & McKeown, 2007; Hairrell, Rupley, & Simmons, 2011; Sobolak, 2011; Quinn, Wagner, Petscher, & Lopez, 2015). Reading comprehension plays a role in almost all other areas of academics (Gray and Yang, 2015).

Results from this study suggests that teaching students academic/tier II vocabulary words will improve their performance in other areas of academics.

In summary, each socioeconomic group learned a similar amount of vocabulary words and also scored similarly on vocabulary and reading comprehension measures, as measured by the *MAP*, following intervention. Some differences existed between the intervention and control group regardless of SES status. Students in the intervention group learned more vocabulary words and scored higher on general vocabulary and reading comprehension measures.

Results from this study were not anticipated based on previous research data. Spencer and Schuele (2012) found students of lower SES to be .5-1.5 standard deviations below students of higher SES on vocabulary measures. The current study found that students of lower SES knew a similar amount of vocabulary words before and after intervention. Past studies have also shown a widening academic gap between students known as the Mathew Effect (Duff, Tomblin, & Catts, 2015). Results from the non-researcher designed posttests (*MAP* scores) this study used suggest that the gap that exists between students of differing socioeconomic classes can be decreased substantially, if not closed. Students who were in the lower SES group scored lower on pretest Reading RIT measures when compared to students of higher SES. This difference did not exist on posttest measures, which suggests that students who belonged to the lower SES were able to "catch up" to the higher preforming students in the higher SES group.

Limitations

One limitation to the study was the small sample size of lower SES students in the two elementary schools where participants were recruited. Results should be interpreted with caution until the study is are replicated with a larger sample. It is unclear whether the same findings would result in school districts with a higher number of lower SES students.

Another limitation of the study was that all of the participants were from two elementary schools within the Grand Forks Public School District. This makes it difficult to generalize the findings from this study to students outside of the GFPS district because the demographics of the participants may vary and that could influence the results.

Future Research

This research suggests that the academic gap that exists among 4th grade students in differing socioeconomic classes can be closed. It would be beneficial to close that gap as early as possible. Future research should focus on examining the effects of SES on vocabulary learning in younger age groups. It will be useful for future research to use students with different demographic characteristics in order to establish the external validity of these findings in the general population. This research would be particularly interesting in areas of predominantly lower SES students such as on reservations in North Dakota and other states.

APPENDIX

Appendix A

ZOT Protocol

Zero-One-Two

Date: _____ **Group: _____**

Subject Number: _____ **School: _____**

Word	Definition	Sentence	Total
1. Temporary	**0 -** **1 -** here and gone, sometimes here **2 -** limited, not permanent	**0 1 2**	
2. Develop	**0 -** **1 -** expand, spread, start **2 -** grow, advance	**0 1 2**	
3. Collapse	**0 -** **1 -** faint, break **2 -** crumble, fall to the ground	**0 1 2**	
4. Vanished	**0 -** **1 -** become zero, invisible **2 -** disappear, lose sight	**0 1 2**	
5. Convincing	**0 -** **1 -** strong, telling **2 -** persuasive, compelling, changing one's beliefs	**0 1 2**	

6. Captivated	**0 -** **1 -** charm, delight **2 -** get the attention, hold someone's interest, fascinate	**0 1 2**	
7. Revolutionary	**0 -** **1 -** extreme, agitate **2 -** new idea, promoting	**0 1 2**	
8. Assume	**0 -** **1 -** expect, believe **2 -** think without proof, suppose	**0 1 2**	
9. Preparation	**0 -** **1 -** research, planning **2 -** getting ready, putting together	**0 1 2**	
10. Stable	**0 -** **1 -** solid, strong, sure **2 -** not likely to change, secure	**0 1 2**	
11. Emerge	**0 -** **1 -** something you see **2 -** appear, come into sight, visible	**0 1 2**	
12. Plentiful	**0 -** **1 -** large, rich, great **2 -** a lot, abundant	**0 1 2**	

13. Hoist	**0 -** **1 -** grab, hold, pull **2 -** lift, raise, elevate	**0 1 2**	
14. Display	**0 -** **1 -** look at, see **2 - t**o show, to put in view	**0 1 2**	
15. Bellowed	**0 -** **1 -** mean, mad **2 -** shout, yell loudly, scream	**0 1 2**	
16. Exhibit	**0 -** **1 -** piece, showcase **2 -** show, reveal, display	**0 1 2**	
17. Descends	**0 -** **1 -** fall **2** -going down, move towards the ground	**0 1 2**	
18. investigate	**0 -** **1 -** go into, analyze **2 -** probe, explore, look into	**0 1 2**	
19. inspire	**0 -** **1 -** instigate **2 -** motivate, encourage, influence	**0 1 2**	

20. Reluctant	**0 -** **1 -** not sure, uninterested **2 -** Unwilling, don't want to, hesitant, resistant	**0 1 2**	
21. Refusing	**0 -** **1 -** drop **2 -** decline, say no, turn down	**0 1 2**	
22. Instructed	**0 -** **1 -** command **2 -** direct, teach	**0 1 2**	
23. Encountered	**0 –** **1 –** met, stumbled **2-** experience, face, go up against	**0 1 2**	
24. Extinct	**0 -** **1 -** old **2 -** gone, dead, lost, no longer have	**0 1 2**	
25. Attempting	**0 -** **1 -** guess, struggling **2 -** to try, make an effort	**0 1 2**	

26. Inspected	**0 -** **1 -** view, look at, search **2 -** study, explore, examine, check, look at closely	**0 1 2**	
27. Satisfied	**0 -** **1 -** better **2 -** pleased, content, at east, happy	**0 1 2**	
28. Revise	**0 -** **1 -** fix, change **2 -** review, reconsider, update	**0 1 2**	
29. Advanced	**0 -** **1 -** higher **2 -** ahead in progress, far on	**0 1 2**	
30. Appeared	**0 -** **1 -** to see, pop up **2 -** come into view	**0 1 2**	

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