INVESTIGATING WORD LEARNING AT THE INTERSECTION
OF SPONTANEOUS AND SCIENTIFIC CONCEPTS

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ABSTRACT

This study incorporated an intervention that combined discussion and sentence writing to promote vocabulary development. Fourth grade students were assigned to either an intervention or control condition. Teachers in the intervention classrooms used a word learning protocol that was designed to provide students with student-friendly definitions and a minimum of 15 exposures to each target word through both receptive and expressive tasks. These tasks called upon students to begin to make connections between spontaneous and scientific concepts to support their word learning. Teachers in control classrooms followed instructional routines as specified in their school’s reading series. Multiple choice assessments from the district adopted reading series for vocabulary and comprehension along with a researcher-developed sentence writing task were used to measure growth in word knowledge. On the multiple choice vocabulary assessment, the intervention group outperformed the control group on one of the three weekly assessments from the reading series. There were no differences in comprehension scores on weekly reading tests across groups. On the sentence writing task, results indicated that the intervention group outperformed the control group with the intervention group showing a statistically significant difference in the rate at which they learned words.
This work is dedicated to my family… my encouragers and cheerleaders

and to my husband, Ken, who listened and waited while I was immersed in this work.

In memory of my parents, Ted and Eve Jaditz.
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Every story has its pivotal moments, and my Temple tale is no different. Those moments have been many. Moments spent in classes puzzling over ideas and learning with colleagues. Moments of frustration when the learning goals were murky. Moments of celebration when clarity arrived.

But, above all, I am truly appreciative for moments spent with two Temple faculty members. The final part of this story began when Dr. Michael Smith ‘adopted’ both me and my project to see it through to completion. I had just a germ of an idea that Dr. Smith helped to develop into this work and, along the way, he expertly demystified how to think through and pen a dissertation. For his encouraging feedback and direction, I am sincerely thankful. As I struggled to analyze bits of data collected during my study, Dr. Joseph Ducette graciously spent time helping to organize my raw data and explaining (again and again) what the numbers meant in terms of significance. Indeed, one of the moments that will always stay with me is when Dr. Ducette uttered, “We’ve got something here!” indicating that my study designed to help children explore word meanings had a significant impact on word learning for students participating in this study. Saying, “Thank you!” once more just does not seem sufficient to express my gratitude to both Dr. Smith and Dr. Ducette for their encouragement and guidance. In truth, they have made my moments at Temple memorable and infinitely worthwhile.
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CHAPTER 1: INTRODUCTION

Researchers have documented the crucial and essential role that vocabulary knowledge plays in becoming a successful reader (Beck & Carpenter, 1986; Cunningham, 2005; Cunningham & Stanovich, 1997; Senechal, Oulette, & Rodney, 2006). Yet, in spite of the abundant research findings about the critical importance of vocabulary instruction, practical methods for teaching vocabulary in schools are typically underdeveloped (Wanzek, 2014; Lee, Roberts, & Coffey, 2016; Loftus & Coyne, 2013). This research effort examined the impact that a particular school based intervention had on vocabulary development for fourth grade students. Specifically, this work was influenced by Vygotsky’s (1987) thinking on how word knowledge develops and the intervention focused on the ways in which children cultivated word knowledge through discussion and writing.

Words are tools that people use to ensure mutual understanding. We use particular words in speaking to share ideas with others. In order to understand one another, people must string together a series of sounds in language and associate the combination of sounds with meaning. For example, if two people hear the word sibling and have experience with the concept of sibling, there is a mutual understanding that allows those people to have a meaningful exchange about siblings. The word serves as a way to interact with others.

Words or concepts, however, do not develop in the same way. Nor do concepts live in isolation since they are constantly being changed and refined based on experiences that people have with words. In examining how concepts develop, Vygotsky (1987)
suggested that they belong to one of two categories, namely spontaneous or everyday concepts and scientific concepts. Each of these concepts develops in unique ways.

**Everyday Concepts and Scientific Concepts**

Everyday concepts come from direct experiences with the world. Children use words to generalize and to label lived experiences. These concepts are the meanings of words of everyday language that a child uses in daily interactions with others. They are dependent on comparing different events, reflecting on activities, and using analogies to see similarities. Everyday concepts develop without systematic instruction and undergo a process of gradual development. They are most often rooted in concrete experiences. For example, a child may hear *sister* when a new sibling comes home from the hospital. The child could deduce that *sister* means ‘anyone smaller than me’ regardless of relatedness; *sister* could be the name of the sibling; *sister* might also be another word for ‘baby’. Because the child’s understanding of *sister* is still emerging, the child may use the word incorrectly in conversation. Over time, however, with repeated exposures in different settings, the child pieces together that *sister* means a female offspring having at least one parent in common with the child.

Scientific concepts, on the other hand, are acquired consciously during systematic instruction. They are “learned or received in completed form through the process of understanding, learning, and comprehension (p 169, Thinking and Speech)” Scientific concepts have a different relationship to the child’s experience than spontaneous concepts. A child receives information about a scientific concept or a word from an outside source, often times from a teacher’s explanation. With assistance of a more
knowledgeable other, the child is challenged with learning concepts with the intent that
the concepts will eventually become useful. A gradual understanding of the new word
develops. The child may initially use the word with only a vague understanding of the
word’s meaning and mastery only comes later through repeated encounters with the word
in a variety of situations where word meaning can be refined.

Differences in these two concepts hinge on a child’s experiences. With everyday
concepts, a child may have experiences with a concept but may not have a culturally
appropriate label available for the concept. With scientific concepts, the child may
have limited or no understanding of or experience with a concept, but must be guided to an
awareness of the word’s meaning by a more knowledgeable other. Vygotsky, however,
notes that the “development of spontaneous and scientific concepts are closely connected
processes (p 177, Thinking and Speech).” How well a child will understand a scientific
concept depends on his maturity of spontaneous concepts; and the understanding of
scientific concepts will influence existing spontaneous concepts. For instance, if a teacher
introduces the word stingy as ‘reluctant to give or spend,’ the child may have difficulty
making a personal connection with the word suggesting that he lacks everyday
experience with the word. However, if the teacher connects the actions of Scrooge to
stingy and the child is familiar with A Christmas Carol, this provides the student with
more information about the word and instruction becomes the basic source of
development of the child’s concepts. The degree to which scientific concepts become
useful for the student depends, in part, on the quality of instruction.
The intervention developed for and used in this study sought to integrate information of both types of concepts to cultivate enduring word knowledge. The hoped for outcome was for students to benefit from building high quality representations of words in order to develop deep and fluid word meanings that would allow them to access and use words skillfully and accurately whenever they wished. Ideally, a student would be able to move from hearing or reading a word he did not understand to beginning to acquire some vague understanding of it to feeling the necessity of using the word. Through this process, the word and concept would be made his own (Vygotsky, 1987).

Owning a Word

Just as the people we know best are those with whom we’ve had the most shared experiences, this same analogy applies to experiences with words. Once words are introduced, how well we eventually know the words depends on lots of exposures in meaningful contexts (Ganske, 2015). These experiences lead to ‘owning a word.’

Owning a word might be described as a process whereby a reader can flexibly surface a word’s meaning for a particular context. Because a reader has had multiple encounters with the word in a variety of contexts, he has built a deep understanding of the word. Upon seeing the word in a text, a reader enlists all previous encounters to make sense of the word in its current context. Beck, McKeown, and Kucan (2013) use dance to show how interactions with a particular word might occur. When a reader comes across dance in a text, he likely does not think of the definition - to move one's feet or body, or both, rhythmically in a pattern of steps. Rather, what comes to mind are all previous experiences with dance. It could be a dance he attended, a type of dance (waltz, two-
step), dance lessons, or how dance might be used as a metaphor (the sun danced on the lake). The reader then selects the correct meaning of dance depending on how it is used in the text and uses that precise word knowledge to bring meaning to the text. Armed with deep word knowledge because of many encounters with a word, a reader can select from an array of word meanings to create a mental image of what an author has intended.

Owning a word also suggests that one can use a word in speaking and writing accurately and at will. As noted earlier, thoughts are expressed and shared with others via language. Of the symbolic systems that humans use to extend mental abilities, Vygotsky (1987) notes that language may be the most important. Using language, children can plan and organize their own activities, express their points of view, propose unique solutions for problems, and interact freely with other people. As children share their ideas, the words chosen to express thoughts determine whether they will be understood. In both speaking and writing, it is important to choose words carefully so that communication is clear and precise. Children with sophisticated vocabularies are often skillful in oral and written tasks since they can use words flexibly to convey their ideas. For example, a child may say or write, “I was astounded when the Phillies won 4 games in a row!” suggesting that the event was unanticipated. The use of the word astounded goes beyond being surprised since it communicates a sense of disbelief. A child’s accurate use of a particular word conveys a robust understanding of the nuances of the word’s meaning.

Finally, owning a word reflects what Demientieff (Cazden, 1993), a native Alaskan, suggests in her reflection on language. “Wanting a word, enjoying a word, and using a word…” are all indicators of ownership. Demientieff expresses a desire to
embrace a word in its entirety and to use the correct word in the appropriate situation. Her statement suggests that there is an affective component at work when selecting particular words to share ideas. A sense of satisfaction that a particular word was selected with care is fueled by the desire to use that word accurately and with precision.

This study, then, sought to explore how instructional routines, guided by research, might affect student word learning as students had opportunities to buttress connections between spontaneous and scientific concepts in an effort to “own” words. More precisely, the following research question directed the thinking for my study: Does an intervention designed to increase word knowledge by using discussion and writing as ways to help students make connections between lived experiences and selected vocabulary improve students’ learning of that vocabulary?
CHAPTER 2: REVIEW OF THE LITERATURE

Although there are several variables that influence how well students understand text, the most persistently identified and most strongly related to reading comprehension is vocabulary knowledge (Anderson & Freebody, 1981; Baumann, 2009; Rosenshine, 1980; Beck, McKeown, & Kucan, 2013). Children learn vocabulary primarily in one of two ways - through direct teaching or through incidental learning. Direct vocabulary instruction includes a clear, systematic presentation of a word and its meaning. When teaching vocabulary directly, teachers check for student understanding of target words, facilitate active participation by all students, and systematically transfer the responsibility of independent word learning to students. Incidental word learning, on the other hand, occurs as children participate in conversational exchanges, as they are read to, or as they engage in independent reading.

The ways in which children learn words best, however, continues to draw the attention of researchers. The design and results of studies included in this review suggest that there is, to date, no consensus in this area. Decades of work suggest that continued investigation into how vocabulary is taught and learned in school settings is warranted. It should be noted, however, that word knowledge exists along a continuum. Knowing a word grows from an initial encounter with a word, where a word meaning is totally unknown, to partial knowledge of a word, to richer and richer understanding of the meaning as encounters with the word increase (Schwanenflugel, Stahl, & McFalls, 1997). Included in the following pages are studies, which show how direct instruction or incidental word learning can help build students’ vocabularies.
Teaching Vocabulary via Direct Instruction

A close reading of the research strongly suggests that direct instruction on targeted vocabulary words produces reliable increases in word learning (Beach, Sanchez, Flynn, & O’Connor, 2014; Stahl & Fairbanks, 1986; Stahl, 2005; Biemiller & Boote, 2006; Coyne, McCoach, Loftus, Zipoli, & Kapp, 2009). Although direct instruction is valuable for all students, it is particularly beneficial for students who enter school with low levels of vocabulary. In fact, benefits of direct instruction may extend beyond individual word learning to increase general vocabulary knowledge and comprehension (Loftus & Coyne, 2013). It should be noted, however, that direct instruction tends not to engage student’s everyday experiences and, therefore, is unlikely to lead to robust understanding of targeted words.

My analysis of the research literature for teaching vocabulary using direct instruction techniques revealed at least six distinct approaches. These approaches include the following: explicit teaching of selected words, a keyword or mnemonic approach, cognitive strategy instruction, computer assisted instruction, discussion based approaches to word learning, and directly teaching multiple meanings of words.

Explicit Teaching of Word Meanings. One of the methods for directly teaching vocabulary is the explicit teaching of selected word meanings. Although there may be a variety of ways to teach vocabulary in classrooms, the context explored here will be teaching of word meanings during read alouds. Reading aloud is a common practice in schools and several authors have examined the connection between read alouds and vocabulary development (Coyne, Simmons, Kame’enui, & Stoolmiller, 2004; Santoro,
Chard, Howard, & Baker, 2008; Silverman, 2007; Wasik, Hindman, & Snell, 2016; Duursma, Augustyn, Zukerman, 2008; Kindle, 2010). A recent study by Loftus and Coyne (2013) will be included in this review, however, due to its unique focus on providing vocabulary instruction within a multi-tiered instructional approach. More specifically, these authors examined how explicit teaching of word meanings during read alouds enhanced word learning for students beginning with higher vocabulary knowledge and those students beginning with lower vocabulary knowledge. To examine these effects of explicit instruction on students’ word learning, Loftus and Coyne conducted two quasi-experimental studies with kindergarten children. In the first study, three classrooms received an intervention (n=56 students) and two classrooms served as a control (n=22 students). The authors followed an approach for directly teaching vocabulary described by Beck, McKeown, and Kucan (2002). The approach included four components: choosing words to teach, providing simple definitions, using the context of a story, and engaging students in extended activities. Teachers and graduate student interventionists participated in the 18-week experiment. Eighteen storybooks, each containing 3 pre-selected vocabulary words, were read twice each week to the students. The same instructional routine was followed during the read aloud for each word. First, words were introduced prior to the first read. When target words appeared in the story, interventionists provided students with simple definitions and then replaced the target words with the definitions. For example, *weeping* appeared in an original text as, “‘Now be sure to write,’ she said *weeping.*” The interventionist then defined *weeping* as *crying* and repeated the sentence, substituting *crying* for *weeping* as, “‘Now be sure to
write,’ she said crying.” Next, interventionists referred to pictures in each of the texts that illustrated each word’s use in the story. In this case, there was a picture of a mother pig weeping. Finally, students repeated each word aloud to strengthen phonological representations of the words. After reading, words were reviewed using a similar format. Words and definitions were reintroduced and pictures were associated with each of the target words. Next, to extend and expand knowledge of each word, interventionists described novel ways that words might be used. Finally, students engaged in interactive activities that focused on identifying positive and negative examples of the words in various contexts (e.g., “I’ll show you some pictures. If you think the picture shows someone weeping, or crying, put your thumbs up and whisper, ‘That’s weeping.’ If the picture does not show someone who is weeping, put your thumbs down and don’t say anything.”) At the end of 18-weeks, effectiveness of the intervention was determined using experimenter-designed measures of target word knowledge and a measure of generalized language and literacy (Peabody Picture Vocabulary Test - PPVT III).

Overall, students who received extended vocabulary instruction performed better than those students in the control classrooms. There was a large effect size for target words on the experimenter-designed measure (d=1.71) and a moderate effect size, although not statistically significant, on the PPVT III (d= 0.60). Loftus and Coyne concluded that direct vocabulary instruction not only can increase knowledge of instructed words but may also influence students’ language and literacy abilities on a more general level. However, how well students performed on posttest measures was related to initial vocabulary knowledge on pretest measures. Simply stated, although all students
benefitted from direct instruction for target words, at-risk students did not lessen the gap between themselves and their peers. Loftus and Coyne’s second study examined whether a multi-tier framework could mitigate this gap.

In this second study, Loftus and Coyne (2012) were interested in analyzing the effects of supplemental intervention for vocabulary for at-risk students. In order to determine risk status, 43 kindergarten students were evaluated prior to intervention using the PPVT III. Twenty students were determined to be at-risk and received both classroom and small group supplemental instruction. The remaining 23 students received classroom-based instruction alone. For a two-week period, two graduate student interns provided both classroom and small-group vocabulary instruction to the Kindergarten students. Each week the interns read one storybook twice and focused on four vocabulary words using strategies for large group instruction similar to those used in the first study. For the 2-week intervention or Tier 2 instruction, four additional half-hour small group sessions were provided for at-risk students. Only half of the target words, however, were reviewed with these students. The supplemental intervention protocol consisted of four components: a review of the two target words’ meanings; a repeat of the classroom-based activity administered the previous day; and two new oral language activities for each target word that were developed to engage the students in discussion around the target words. All students were assessed using four experimenter-developed measures of target word knowledge designed to capture varying levels of word knowledge. Overall, the results of this study suggested that Tier 2 vocabulary intervention could be effective. At-risk students who received additional Tier 2 intervention learned the meanings of target
words better than the meanings of words receiving only classroom-based vocabulary instruction. A 7-week delayed posttest showed that students maintained word knowledge over time. Further analysis of effects on instruction indicated that at-risk students receiving supplemental vocabulary intervention in addition to classroom-based vocabulary instruction were able to make gains in vocabulary knowledge that approached those of their not-at-risk peers.

Using explicit teaching of words as one of the possible direct instruction vocabulary routines, Loftus and Coyne’s (2012) thinking and methodology aligns with Vygotsky’s notion of the development of scientific concepts. Structured and systematic instruction, in the form of precise verbal definitions, in a school setting is crucial to a child’s acquisition of scientific concepts (Vygotsky, 1987; Wellings, 2003). More specifically, “the development of the scientific concept, a phenomenon that occurs as part of the educational process, constitutes a unique form of systematic cooperation between the teacher and the child” (Wells, 1994). In each of the studies, teachers and interventionists deliberately discussed and taught specific vocabulary words from selected texts. They provided definitions that were age appropriate and linked the words back to events and pictures in the storybooks. They provided children with additional examples of target words to build students’ depth of knowledge. In the multi-tiered intervention study, at-risk students received a second dose of small-group instruction in an attempt to bring vocabulary knowledge closer to that of children not at-risk. What appears to be missing in Loftus and Coyne’s examination of vocabulary development, however, is a clear and intentional connection to the Kindergarten children’s everyday
understandings or spontaneous concepts to ensure that word meanings become robust enough for the children to use the words consciously across different settings. Scientific concepts just start their development, rather than finish it, at a moment when a child learns a term or word-meaning denoting a new concept. Vygotsky notes that “the difficulty with scientific concepts lies in their verbalism.” New ideas are explained by a more knowledgeable other but in this process, information is gathered receptively and it becomes the student’s responsibility to make connections to what he already knows. Unless a child can connect the definition or new information about a word to experiential knowledge, the potential exists for fragmented or inaccurate understandings of words. Although vocabulary assessments used in these studies indicated that students’ word knowledge improved, it should be noted that the experimenter-designed assessment measured the degree to which students learned the vocabulary words, which were the focus of instruction. Students were generally successful in demonstrating some knowledge about words, which were taught. The PPVT III results also indicated an increase in general word knowledge but gains were not statistically significant. What can be concluded is that knowledge of specific words, as measured by particular types of assessments, can be influenced by explicit instruction but what remains unclear is the degree to which students might connect words taught to their personal experiences or everyday concepts.

Another potential shortcoming in Loftus and Coyne’s (2013) work exists in how word knowledge was evaluated. The researchers used several assessments. In the first study, students were asked to define words and respond to questions containing words in
neutral contexts (e.g., with *halt* as the target word, “What would you be doing if you were *halting*?”). Definitional knowledge alone would be enough for a student to receive credit for knowing a word such as *halt*. This assessment may not show whether the student is able to use the word in novel contexts when the opportunity arises. Students were also asked comprehension questions after listening to a story containing the 18 target vocabulary words. Only five of the 10 questions, however, contained one of the target words used in the story. In the second study, four experimenter-developed measures were designed to capture varying levels of word knowledge. On the Word Recognition measure, students heard a list of nonsense words and target words and indicated whether they had ever heard the words before. This task indicated whether children could identify a phonological representation of a word. On the Target Word Picture Vocabulary measure, students were shown four picture choices for each target word and pointed to the picture that corresponded to the target word provided by the examiner. The Context Questions measure assessed the students’ ability to respond to a question that contained the target word in a neutral context. Finally, the Expressive Definitions measure required students to provide the definition of each target word. Although these measures may provide teachers with some information about how a student knows about the target words, it is only when a child is consciously aware of a word and has voluntary control over using the word (Wellings, 2003) that the child truly knows that word, which is why my study will include a measure of expressive vocabulary knowledge.

**Keywords or Mnemonic Devices.** A second method for directly teaching vocabulary is using keywords or mnemonic devices during word study. One of the
earliest and most influential studies examining this method, having nearly 700 citations, was conducted by Atkinson (1975). Results of this study will be included in this review. Although Atkinson’s original work focused on the use of the keyword approach for teaching foreign language vocabulary, the method has since been used successfully across a range of learning situations including botany concepts (Rosenheck, Levin, & Levin, 1989), science facts (Morrison & Levin, 1987), English vocabulary (Pressley, Levin, Kuiper, Bryant, & Michener, 1982), as well as with students who have learning disabilities and emotional disorders (King-Sears, Mercer, & Sindelar, 1992; Mastropieri & Scruggs, 1988).

The keyword mnemonic is a two-stage technique (Atkinson, 1975; Atkinson & Raugh, 1975). The first stage requires the learner to associate a spoken word with a selected keyword. Ideally, this association is formed quickly because of the two words’ acoustic similarities. Atkinson noted that when keywords were supplied by an experimenter, subjects performed significantly better on a comprehensive test compared to when subjects generated their own keywords. The second stage requires the learner to form a mental image of the keyword “interacting” with the targeted vocabulary word. In this second stage, Atkinson’s study results seem to indicate that recall is enhanced when students generate their own imagery link rather than having an image provided or suggested by the experimenter. The keyword method can be described, then, as a chain of two links connecting a vocabulary word to another keyword. The spoken vocabulary word is linked to a keyword by a similarity in sound, what Atkinson labeled as an “acoustic link”. In turn, the keyword is linked to a mental image or an “imagery link”.
For example, consider that a student must learn the obscure English word *claymore* meaning *sword*. The first stage in the keyword approach is to identify a concrete noun, i.e., keyword, which is phonetically similar to *claymore*. In this example, *clay* could be a suitable keyword. The second stage requires the learner to form an image that combines the keyword with the meaning of the vocabulary word. The learner might envision a sword piercing a slab of clay. Later, when the learner hears the word *claymore*, the keyword *clay* would be retrieved along with the keyword-based image involving *sword* (Thomas & Wang, 1996).

Atkinson (1975) conducted a series of experiments to test the keyword method. In one study, subjects learned a vocabulary of 120 Russian words. Two groups, a keyword group and a control group, participated in the study. The keyword subjects were given written instructions describing the keyword method, including the use of the keyword as an acoustic link and the creation of an image as an imagery link. Words were divided into 40-word lists for presentation on 3 separate days. During the study, each Russian word was pronounced three times and, simultaneously, the English translation was provided to all study participants. The translations, as well as keywords for each vocabulary word, however, were provided to the keyword subjects. A comprehensive test was administered after all 120 words were presented and, without warning, subjects were called back six weeks later for a second comprehensive test. For the total vocabulary, the keyword group recalled 72% of the vocabulary items on the first comprehensive test, whereas the control group recalled 46%. On the delayed posttest six weeks later, the keyword group recalled 43% of the words and the control group recalled 28% of the Russian words. The ratio of
control to experimental scores was .64 on the first comprehensive test and .65 on the
delayed comprehensive test. Atkinson noted that “these are indeed large differences and
highly significant statistically.”

In a second study using the keyword approach to learning vocabulary, Atkinson
(1975) achieved similar results but used Spanish words. This study confirmed that
providing learners with keywords, but not images, produced stronger results. On a
comprehensive test, learners in the control group recalled only 28% of the words. The
keyword group recalled 88%.

Similar to Loftus and Coyne’s (2012) investigation using direct instruction to
teach words, Atkinson’s (1975) work using the keyword approach for learning
vocabulary is in harmony with Vygotsky’s (1987) description of the development of
scientific concepts. These concepts are learned or received in completed form through the
processes of understanding, learning, and comprehension and, as such, are adopted by the
child in completed form guided by an adult’s thinking. For example, using this approach,
Atkinson noted that learners mastered greater numbers of words when keywords were
provided by the experimenter. The first step in learning selected vocabulary was to
provide learners with words that were acoustically similar to target words. The
experimenters selected keywords for students, thereby attempting to support learners to
make associative connections between keywords and vocabulary. Vygotsky notes that
concept development, however, is “complex and a true act of thinking” and goes beyond
simple memorization, here by memorizing acoustically similar words. Therefore,
although Atkinson’s keyword method does seem to support students’ learning
vocabulary, it falls short of true concept development since attempts to connect the target vocabulary to the learner’s direct experiences with the world are not included in the protocol. Additionally, for the second stage of the keyword approach, Atkinson found that when images were provided to the learners, the images concocted by the experimenters were less effective than images constructed by the learners themselves. As an example, Atkinson cited using an image of an oak tree with acorns dangling as little brass bells, to support learners as they mastered the Russian word, zvonok (pronounced ‘zvahn-oak’), for bell.

A second possible limitation in Atkinson’s (1975) work is revealed in how word knowledge was measured in the study. For the assessments, which determined whether words were known, learners were asked to translate words into English. As a labeling task, this represents just the beginning point for concept development. According to Vygotsky, Karpov (2003) pointed out that “scientific concepts… just start their development at the moment when the child learns the term denoting the new concept.” Learning just verbal factual information does not lead to students’ use of knowledge for solving subject domain problems. Although learning labels for words and objects may be the initial step toward concept development, Atkinson did not clarify whether or how the target vocabulary was used to demonstrate relevant conceptual knowledge. The hallmark of true learning is a high level of mastery, broad transfer, and intentional use by students. Atkinson’s assessments did not exemplify this type of learning.

**Cognitive Strategy Instruction.** A third method for teaching words via direction instruction incorporates cognitive strategy instruction. Cognitive strategy users are able to
coordinate both metacognition and knowledge to become successful learners (Pressley, Borkowski, & Schneider, 1987). Pressley et al. indicate that sophisticated thinkers are able to access many strategies to obtain a desired goal; they know how, when, and where to apply specific strategies; and these learners know that successful learning is tied to effort. Research suggests that word knowledge can improve when students use cognitive strategies (Pressley, 1990; Gu & Johnson, 1996; Harmon, Buckelew-Martin, & Wood, 2010; Florida Department of Education, 2009). These strategies help students categorize vocabulary words by noting similarities and differences among related ideas. One strategy appearing in the literature reviewed for this investigation that supports learning vocabulary is the Frayer model. Several decades ago, Frayer, Fredrick, and Klausmeier (1969) sought to create an instrument that would aid in evaluating how concepts were attained. This early effort prompted the creation of a graphic organizer, named for the first author, which is a framework students can use to define vocabulary words or concepts and to apply definitional knowledge by generating examples and/or non-examples for the target word. In the Frayer model, information is placed on a template that is divided into several sections. The template or graphic organizer provides a visual representation of vocabulary words for students. Since 2000, over 850 studies have referenced the use of the Frayer model to teach vocabulary. Due to its recency, one study examining the effectiveness of the model will be explored in the following paragraphs.

As an example of how the use of a cognitive strategy might support word learning, Palmer, Boon, and Spencer (2014) replicated and extended earlier work by Bos and colleagues as cited by Jitendra, Edwards, Sacks, and Jacobson (2004) to compare
how well students learned vocabulary words with one of two approaches – a dictionary approach or a concept mapping model using the Frayer model. Four middle school students with mild disabilities who were assigned to a language arts resource classroom participated in the study. Twenty words for each approach were randomly chosen from a seventh-grade language arts vocabulary workbook used by teachers in the school where the study took place. Instructional sessions, lasting approximately 20 minutes and focusing on just five words, were held once per week. These sessions were conducted by the teacher researcher assigned to the resource room. Both the dictionary approach and the concept mapping model condition consisted of four sessions. Instructional conditions alternated during the phases of the study. An initial dictionary approach condition was followed by the concept mapping model condition, followed by a return to the dictionary approach condition and ultimately ending with the reintroduction of the concept mapping model.

For the dictionary approach, a list of five new words was read aloud to students during an instructional session. Students were instructed to use a dictionary to locate the definition of each word and to write the first definition given in the dictionary into a vocabulary notebook. After students wrote the definition, they were instructed to write each word in an original sentence. Last, students participated in a class discussion in which a concise definition for each word was decided upon by the group. Questions about any of the words were addressed by the teacher researcher. After the class discussion, all student worksheets were gathered and checked for accuracy of word usage in the sentences.
During the concept mapping condition, students were told that they would be using a graphic organizer to learn new vocabulary words. During the instructional session, the teacher researcher provided the students with a list of five new vocabulary words as well as five copies of a blank Frayer model graphic organizer. The teacher read aloud each of the vocabulary words and asked students to write each word in the middle of their concept maps. Next, students were provided with the word’s definition, which they copied into the appropriate section on their maps. Third, the researcher discussed the definition of the word, used the word in a sentence, and answered student questions about the new word. Fourth, students created an original sentence and wrote the sentence in one of the boxes on the map. Fifth, the researcher asked the students to independently write what the word reminded them of in the appropriate box on the concept map. In the final step, students were instructed to draw a picture related to the word in the remaining box on the concept map.

Vocabulary assessments in this study consisting of 10 multiple-choice items were administered two days after each instructional session to determine the percentage of vocabulary words the students had learned during each of the sessions. The mean score across the four students increased from 44.38% in the initial dictionary approach phase to 79.38% with the introduction of the concept mapping instruction. Mean score then fell to 44.38% with the return to the dictionary approach. Finally, mean score increased again to 90% with the reintroduction of the concept mapping instruction. Palmer et al. (2014) concluded that this study supports the efficacy of using a concept-mapping model versus a dictionary instructional approach to improve vocabulary knowledge and development.
of four middle school students with mild disabilities. Overall, use of the concept-mapping model resulted in an increase in acquiring novel vocabulary words by all four students when compared to traditional dictionary instruction. Students’ mean scores nearly doubled from the use of the dictionary approach to the implementation of the concept-mapping model.

The Frayer model offers students multiple modalities to reinforce learning new vocabulary words. Students define words, write words in original sentences, create word associations that help to conceptualize mental images of the words, and draw pictures related to the words. This variety of interactions with words as reported in the Palmer et al. (2014) study increased the likelihood of students’ remembering word meanings. Although the number of students in the Palmer et al. study was a small targeted group, other authors reference how the Frayer model has been used with similar positive results across a variety of content areas and student populations (with struggling readers by Harmon & Hedrick, 2005; in science and mathematics by Adams & Pegg, 2012; in mathematics by Adams, 2010; in social studies by Turner, Russell, & Waters, 2012; with hearing impaired students by Luckner & Cooke, 2010).

As another example of a direct instruction approach to word learning, the use of the Frayer model seems to assume that concepts develop along with the words. However, even with multiple exposures to a word using different modalities, as is indicated by the Frayer model, students may not have a deep understanding of a given word particularly when, as in Palmer et al.’s (2014) study, instruction occurred during a brief 20-minute session one time per week. Vygotsky (1987) suggests, “concepts or word meanings
develop and … this developmental process is complex and delicate.” He further states that although a word may be comprehensible to a student, the student may lack the concept that the word expresses. Word knowledge grows gradually as a student first encounters a word and then develops as the word is seen or heard in a variety of contexts. It is through this process that, bit by bit, students build word knowledge and understanding. Although it is possible to work directly on concepts via the Frayer model, this is just the beginning of the development of a targeted concept. The degree to which the new word is learned and mastered depends, in part, on each child’s rich, personal experiences prior to the moment when the new word is introduced. Since each child’s life experiences vary, it is difficult to determine whether the information that the child has stored is an adequate foundation for the development of scientific concepts as presented within the Frayer model.

A second potential shortcoming in Palmer et al.’s (2014) study exists in how word knowledge was measured. Multiple-choice assessments, although frequently used for gauging student knowledge, may not be the best metric to evaluate depth of word knowledge. These measures offer students an array of choices along with genuine chances to guess a correct answer. This type of assessment does not allow students to apply knowledge of words intentionally and voluntarily, one of Vygotsky’s criteria for scientific concept development.

**Computer Assisted Instruction.** A fourth method for directly teaching vocabulary is via computer-assisted instruction (CAI). Using web-based tools, content can be delivered to students in a variety of ways - via text, graphics, audio, or video.
Web-based learning has become a common platform for delivering instruction in schools. These multimedia components get and hold learners’ interest, which some researchers believe is important when teaching the video generation (Kim & Gilman, 2008). Studies, as early as 1987, have examined effect sizes for CAI. Several report promising results (Fletcher-Flinn & Gravatt, 1995; Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). For this reason, CAI, specifically for its role in teaching vocabulary, is included in this review of the literature as another method for teaching vocabulary.

Proctor, Dalton, Uccelli, Biancarosa, Mo, Snow, and Neugebaue (2011) examined the effects of an internet-delivered vocabulary intervention for fifth graders to determine how this type of instruction affected vocabulary development and comprehension. Two hundred forty-two students, 49% of whom were English-Spanish bilinguals, participated in the 16-week study. One hundred twenty-nine students were in the experimental group and 111 students were in the control group. Students in the experimental group received an intervention called ICON (Improving Comprehension Online) designed at the Center for Applied Special Technology (CAST); students in the control group received the traditional literacy curriculum.

Students in the ICON group worked in a strategic digital reading environment (SDR) for two 50-minute sessions per week. The SDR included “8 short digital texts equipped with a variety of features, including: Spanish translations of all texts and directions; human read-alouds of each text in English and Spanish; English monolingual and Spanish-English bilingual pedagogical ‘coaches’ who provided assistance with using the system and responding to prompts in a revisable electronic work log that collected
students responses; a multimedia glossary; and pictures illustrating the narrative and informational text content” (Proctor et al., 2011). These features were available to students but students chose whether to access them. ICON students were directly taught 40 words, five per text, during the intervention. Words were selected using several criteria: (a) Tier 2 academic words (Beck et al., 2002); (b) degree of morphological and/or semantic richness; (c) relatedness with the Spanish translation of the word; and (d) centrality of the words’ meaning to comprehension of the target text. In pre-reading activities, students were given each word’s definition, its Spanish translation, an example sentence, and a relevant image. They heard the word pronounced then wrote or audio-recorded a personal connection to each word. Students also listened to novel cross-linguistic, morphological, or semantic information about the target word. For instance, for the word anxiously, students heard, “Think about a Spanish word that looks or sounds like the English word. If they have similar meanings, they are cognates. Anxiously and ansiosamente are cognates. Is this talk of cognates making you anxious?” Next students worked with digital word webs that required them to identify examples, non-examples, synonyms, and/or antonyms of the vocabulary word via multiple choice entries. Support was provided if students selected the incorrect response. In the final activity, students were shown an image representing the target word and were asked to add a caption for the image that demonstrated that they knew the word. Students spent approximately 15 minutes per 50-minute period working through vocabulary tasks prior to working in the associated text.
Several assessments were administered during the intervention. The Gates-MacGinitie Reading Achievement Test was given to all students, both pre- and post-intervention, as a measure of reading comprehension, reading vocabulary, and overall reading skill. This assessment presents students with a sentence or clause with an underlined target word. Students are required to select a synonym for the underlined word from five options. The words assessed in the 45-item battery include very frequent words, general academic words, and very rarely used words. The average mean entering vocabulary score was 488.22, placing the fifth grade sample at the 35th percentile. Although the ICON and the control groups did not differ from one another at pretest on either the Vocabulary or Comprehension measures in the Gates-MacGinitie test, marked differences were noted at posttest between English and Spanish-English participants, all in favor of the English group. Additionally, significant effects for vocabulary among all participants in the ICON group were noted at the end of the study (gain of 10.0). Results on Gates-MacGinitie Comprehension, however, were non-significant. Target vocabulary was measured after the intervention period with the Vocabulary Breadth Test (VBT), a researcher-designed multiple-choice test that focused on 20 of the 40 total target vocabulary words. In the VBT, words were embedded in phrases, followed by a correct response and three distractors. Analysis of data from the VBT indicated no effect was detected for either the experimental or the control groups. A researcher-designed Vocabulary Depth Test (VDT) was also used to assess students’ abilities relative to depth of word knowledge. Students were asked to complete two tasks: (1) provide written definitions of words; and (2) draw and create a caption for target words. Just 5 words
were targeted in the VDT. For these two tasks, significant intervention effects were noted. Students in the ICON condition gained .11 points on the 4-point score rubric for each completed text, meaning that a student who completed all 8 texts in the ICON group outperformed his control counterpart by .88 points on the overall score on both the VDT Definition and the VDT Caption tasks. To conclude, the ICON intervention showed large and significant effects on the standardized measure of vocabulary knowledge as well as on the two components of the VDT researcher-developed measure of word knowledge.

As with the previous direct instruction vocabulary studies, Proctor et al.’s (2011) intervention attempts to transmit concepts directly to students, here using CAI technology. The ICON intervention provided several opportunities for students to interact with words (human read alouds, multimedia glossary, pictures illustrating content) beginning the students’ process of understanding the word. Yet, as Vygotsky (1987) notes, “the process of development has not been completed but has only begun” at the point of a word’s introduction. Although the study did confirm that word knowledge of the taught words increased as measured by some of the assessments, nonspontaneous concepts are “not simply acquired or memorized by the child.” They must be developed by an “extraordinary effort” of the child’s own thought or the acquired knowledge cannot be flexibly applied (Karpov, 2003). A child knows a word deeply when he uses the word purposefully and of his own accord. What seems to be missing here is intentional effort to connect each of the words to the fifth graders’ everyday understandings.

Another possible limitation in this study is reflected in the way word knowledge was measured. Vocabulary in the Gates-MacGinitie test is measured via multiple-choice
items. As noted earlier, multiple-choice assessments, as selection tasks, require that a student need only to recognize a synonym to mark the item correctly. Guessing is also a possibility in any multiple-choice assessment, making test results inconclusive as to whether the student has a fully developed understanding of the target word. The VBT also measured vocabulary via multiple-choice test items. Again, a student need only recognize a plausible answer to get credit for knowing a word. The VDT assessment required students to complete two tasks - to provide a word’s definition and to provide a reasonable caption. Although a definition could reflect robust understanding of a word, it could also be a memorized group of words that have little or no meaning to the child. Either response would receive test credit. Ideally, a definition generated by a child leaves no doubt in an assessor’s mind that the child has a deep understanding of a word’s meaning. The second task in the VDT assessment, creating a drawing with caption, may have provided more information on a child’s depth of word knowledge since the child was required to “make an image come alive by adding an interesting caption that included the vocabulary word and showed understanding of the word.” Evaluated by trained research assistants to reflect partial, stable, or elaborated semantic knowledge, knowledge of 5 words was used as a gauge in determining how well taught words were learned. In fact, the caption assessment only truly evaluated a child’s understanding of the 5 words tested.

**Discussion to Promote Word Learning.** Yet another direct instruction method for teaching vocabulary, and the fifth method included here, is focusing on word learning during classroom discussions. Evidence directly relating quantity of discussion in
language arts and social studies classrooms to student academic outcomes is strong (Applebee, Langer, Nystrand, & Gamoran, 2003; Gamoran & Nystrand, 1991; Nystrand & Gamoran, 1991; Nystrand, Wu, Gamoran, Zeiser, & Long, 2003). Nonetheless, rather little discussion goes on in the typical U.S. classroom (Hattie, 2012; Applebee et al., 2003; Gamoran & Nystrand, 1991). In an effort to evaluate the impact of discussion on word learning, Lawrence, Crosson, Pare-Blagoev, and Snow (2015) examined the effects of a curricular intervention designed to improve the quality of classroom discussion as a vehicle for promoting students’ development of general academic vocabulary. Lawrence et al. note, “…vocabulary instruction has not previously been incorporated as a primary goal of discussion-based teaching methods, yet discussion is one approach to meeting conditions known to support vocabulary learning.” This study is included here due to its recency and its focus on the topic of interest for this investigation, namely methods for directly teaching vocabulary in school settings.

The vocabulary intervention used in this study, Word Generation, is a cross-content academic language program grounded in vocabulary acquisition research designed for use with middle school students. Each week, the program explicitly teaches five new vocabulary words identified as “high leverage academic words.” According to Lawrence et al. (2015), these words “are likely to be encountered in academic texts in multiple domains and thus be especially important to developing readers.” For example, words such as relevant, presume, and indicate are included in the program. As a supplementary curricular resource, Word Generation provides teachers with a series of discussable dilemmas designed to promote students’ academic language. Seventy-two
one-week units designed to be of interest to young adolescents are included in the program. Brief fifteen- to twenty-minute activities are embedded across content areas and focus on the same five targeted academic vocabulary words for each of the weekly selections. Students read, discuss, debate, and write about the weekly topics in language arts, science, social studies, and math classes using the taught words (wordgen.serpmedia.org/weekly.html). Twenty-eight schools in two districts participated in this randomized trial. Students were in grades 6, 7, and 8. Phase 1 buildings (15 schools, 932 students) implemented the program for two years. Phase 2 buildings (13 schools, 622 students) served as controls but were offered the opportunity to implement Word Generation after the completion of the randomized trial.

Since Word Generation focuses on both classroom discussion and vocabulary knowledge, assessment data were collected in these two broad areas to determine program effects. A classroom discussion rubric was developed to measure dimensions of discussion quality including student participation, student engagement, teacher talk moves, and substantive contributions. These measures contributed to a composite score that allowed the researchers to compare classroom environments. Two assessments provided pre- and posttest data for gauging vocabulary growth during the study. First, a multiple-choice assessment on 36 of the vocabulary words included in the Word Generation program was administered to all students. Each assessment item presented a target word, underlined, in a neutral sentence context. Students selected from among four options the one that was the closest synonym for the target word. Next, as was included in the Proctor et al. (2011) study, the Gates-MacGinitie vocabulary assessment was used
here as an indicator for a broader measure of word knowledge. Depending on grade level of the students, the Level 6 or Level 7/9 measure from the Gates-MacGinitie assessment was used. Lawrence et al. (2015) note, “despite the careful randomization process, students in treatment schools had higher vocabulary knowledge at pretest” on these two measures so differences between students’ posttest and pretest scores in treatment and control schools were used to calculate effect sizes.

Several findings of the impact of discussion on vocabulary development were reported by Lawrence et al. (2015). First, teachers implementing Word Generation had dramatically higher ratings, with an effect size (Cohen’s $d$) of 0.62, than control teachers on the classroom discussion rubrics designed for the study. Effect sizes ranged from (Cohen’s $d$) 1.13 in math to (Cohen’s $d$) 0.38 in social studies. Despite the strong treatment effects for student participation in classroom discussion, however, the program had only a small effect on student knowledge of targeted academic vocabulary. Students in the treatment school scored roughly 1.5 points higher on the curriculum-based measure. There was no effect for students in treatment classrooms on the Gates-MacGinitie vocabulary measure.

Using this particular direct instruction routine, Lawrence et al.’s (2015) exploration of how students learn vocabulary aligns with Vygotsky’s notion of the development of scientific concepts. The words selected for use in the study were taken from the Word Generation curriculum and, for the most part, are included in Coxhead’s (2000) Academic Word List (AWL). The AWL was compiled from 3.5 million running words of written academic text by examining the range and frequency of words outside
the first 2,000 most frequently occurring words in the English language. As such, Coxhead’s AWL includes words that are “most worth studying” (Coxhead, 2000). In this Word Generation study, students were introduced to words that may have been outside of their personal experiences. They became conscious of word meanings during instruction when they learned the verbal definition. However, unless the word was intentionally connected to personal experiences, a gap potentially exists in the child’s ability to use the word in real thinking or in any concrete situation (Blunden, 2009). Lawrence et al. described that word use was encouraged across content areas, thus providing a student with multiple exposures to words selected for study. Moreover, although students had opportunities to use words across settings, it is unclear whether the words, as scientific concepts, were developed as true concepts. Word knowledge must progress beyond verbal factual information (Karpov, 2003) to the point where words are used confidently to think.

A second potential limitation in Lawrence et al.’s (2015) study centers on how word knowledge was measured. Similar to the Proctor et al. (2011) and Palmer et al. (2014) studies, Lawrence et al. used multiple choice assessments to gauge word knowledge. Although this type of assessment is widely used and accepted, the true measure of word knowledge can only be confirmed by broad transfer and intentional use by students. One of the tasks included in the Word Generation did hint at students’ word use at this higher level. Specifically, during the last day of the word learning protocol, students engaged in a writing activity. Students were given a prompt and were asked to write a response in which they argued a position on the week’s topic, using focus words
from the current or past weeks. Successful completion of this task could have been used as one metric for determining depth of word knowledge. This writing, however, was not included as an assessment to determine the intervention’s efficacy.

**Multiple Word Meanings.** Although several direct instruction methods for teaching vocabulary have been addressed up to this point, none has examined how to teach multiple meanings for words; rather, instructional approaches have focused on teaching single word meanings. Many words in English have more than one meaning, which can present challenges when selecting words to teach. Although the Common Core State Standards emphasize the need to “determine or clarify the meaning of unknown and multiple meaning words and phrases based on grade level content”, the phrase, *multiple meaning*, has several interpretations. Beck, McKeown, and Kucan (2013) indicate that *multiple meanings* can refer to homographs, which are words that are spelled the same, usually pronounced the same, but have different meanings. For example, consider *can*, as a cylindrical metal container; *can*, used as slang for being dismissed from work; *can*, to have the ability to do something. *Multiple meanings* can also refer to words that have multiple senses, which are semantically related. Consider *model* used to mean ‘an exemplar’ as in a *model student*. This meaning is related to *model* as a verb meaning ‘to model oneself after.’ Each of these multiple meaning words creates unique challenges for teachers and students. Beck et al. note that understanding that the same word form can have distinctly different, unrelated meanings is part of learning language and, with plentiful practice using words and abundant talk, these challenges can be ameliorated.
One study, which addresses the teaching of multiple meaning words, was conducted by Nelson and Stage (2007). This study will be included in this review because, according to the authors, limited attention has been given to this topic in the literature. The authors suggest that explicitly teaching students that most words they encounter have multiple meanings that may fall into different semantic categories should have positive effects on reading comprehension since students need to attend closely to how contextual clues influence word meanings. In addition, teaching students that the meanings and semantic categories of many words are influenced by context provides them with word learning strategies that could be used beyond the words being taught. Word learning strategies are helpful since teaching definitions of every word students will encounter is not possible. Consider the word *light*. Knowing that *light* means “a thing that provides illumination” may not help in understanding *light* in the following ways: “We awoke at the first *light* of dawn” (meaning early in the day when the sun appeared in the eastern sky); or “Mary selected the *light* blue dress” (meaning pale in color); or “The butterfly may well *light* on the asters in the garden” (meaning to land).

The primary purpose of this study was to determine how contextually based multiple meaning vocabulary instruction influenced vocabulary knowledge and reading comprehension of elementary school students. Two hundred eighty-three third (n=134 in 8 classrooms) and fifth (n=149 in 8 classrooms) graders participated in the study. Third and fifth grade classrooms were randomly assigned to an experimental or non-specific treatment condition. Classrooms received either standard language arts instruction alone or contextually based multiple meaning vocabulary instruction embedded in the standard
language arts instruction. Students were pre- and post-tested using a standardized assessment of vocabulary knowledge and reading comprehension, the Gates-MacGinitie reading test, 4th edition. Based on pre-test results, students were grouped into a low or an average to high group. Multiple meaning words used in the study were classified as Level I (i.e., words with two mutually exclusive meanings) or Level II (i.e., words with three or four mutually exclusive meanings). Words were initially selected from *The Living word Vocabulary* (Dale & O’Rourke, 1981) and this list was refined using *The Educators Word Frequency Guide* (Zeno, Ivens, Millard, & Duvvuri, 1995).

During the four-month study, all teachers followed the district’s language arts curriculum. Students in the experimental condition received contextually based multiple meaning vocabulary instruction on 36 target words as well as 3 related words per meaning. Third graders received instruction for Level I words; whereas fifth graders received instruction for Level II words. Each target word and associated set of related words was taught over 2 days for approximately 20-30 minutes each day. On Day 1, meanings of target words were introduced to activate prior knowledge. For example, *accident* has two meaning: (a) unexpected happening and (b) event that causes damage. Related words included *fluke, mishap,* and *by chance.* Students discussed sentences that used the related words in context and were encouraged to write novel sentences on their own. On Day 2, students learned about the word’s history. Additionally, they participated in a “Word Meaning Map” activity where they matched related words from Day 1 and completed an activity called “Complete Each Definition” where definitions were written for all words. Next, there was an “Understanding Check” where students coded word use
in sentences as *expected* or *not expected*. Specifically, students read the following scenario: *Jasmine worked to save money for a new car. The car was perfect in every way. It looked like it had been in an accident.* This scenario was coded as *not expected*. For the final activity, students wrote short stories using the target words.

Overall, study results indicated that only some students who received the intervention showed gains in vocabulary knowledge and reading comprehension relative to students who did not. Gains were most evident in reading comprehension and for those students with initial low vocabulary knowledge and reading comprehension. Although third and fifth grade students showed statistically significant gains in vocabulary knowledge, results were more pronounced for 3rd grade students. Effect size for third graders was (*ES*) .28 and (*ES*) .14 for fifth graders. Students with high to average pre-test data did not show statistically or educationally significant gains in vocabulary as compared to students in the non-specific treatment condition. Third graders with low and average to high initial vocabulary and comprehension achievement who received the intervention showed statistically significant gains in comprehension. Gains were moderate (*ES* = .67) for low performing students and average (*ES* = .57) for average to high performing students. Fifth graders with low initial vocabulary and comprehension achievement showed statistically significant, but moderate, gains in comprehension skills (*ES*=.46); whereas, those with average to high initial vocabulary and comprehension achievement did not.

As with other studies highlighting the use of direct instruction for teaching word meanings, the Nelson and Stage (2007) study supports the notion that explicit instruction,
here of multiple meaning words, can positively affect both word knowledge and comprehension. Interestingly, of the studies included here which used the Gates-MacGinitie test to measure word knowledge, this is the only study showing improved student performance on this standardized measure of vocabulary and reading comprehension. The idea that word meanings can be directly taught echoes Vygotsky’s thinking on the development of scientific concepts. That is, understanding of a word begins via direct teaching of its meaning. On Day 1, students were introduced to the contextually based multiple meaning words via definition. Although providing explicit connections between words was also incorporated into instruction, the definition provided the initial exposure to the new concept. At this entry point, the student had access to verbal information and, perhaps, little or no referent in everyday experience, making flexible use of the new word underdeveloped. For flexible use to occur, the student would need support to connect the word’s meaning to personal experience. Even in Day 2 instruction, additional exposures to words may not be enough for a robust understanding of a particular word to occur.

Relative to assessment, this study, too, relied on a standardized assessment to gauge word knowledge. Although the Gates-MacGinitie may be an efficient assessment tool, for reasons noted earlier, it may not reflect how deeply students understand and can use words. Word meaning is a complex and true act of thinking and people use words to make meaning and express meaning to others. Selecting a correct response on a multiple-choice test indicates whether the child can recognize a word’s meaning. It does not reflect whether the child can think with the word.
Incidental or Indirect Learning of Vocabulary

The second distinct way that children learn words is through incidental means. School age students appear to increase their vocabularies by thousands of words per year. Although there is no consensus on the exact number of words students learn, estimates range from a conservative 600 words per year to more than 5000 (Nagy, Herman, & Anderson, 1985). Students are taught some of these words through direct instructional approaches but there are too many words to teach all of them directly (Graves, 2006). Much of a child’s vocabulary knowledge, then, is acquired indirectly (Stern, 1987; Luckner & Cooke, 2010; Snow, Burns, & Griffin, 1998).

Indirect or incidental experiences that serve to increase student vocabularies include opportunities to encounter new words through engaging in oral discussions, listening to stories, and reading widely. In social settings, children hear and learn words through conversational exchanges with more sophisticated language users. They have opportunities to learn words as mature language users pay close attention to children’s communication attempts and orally respond to them about an activity or an object of interest. Simultaneously, the skilled language user models new vocabulary, expands on children’s language, prompts to keep the conversation going, and repairs conversation breakdowns. Compared to oral language exchanges, however, new or unfamiliar words occur at significantly higher rates within printed media than in conversations, even those conversations with mature language users (Hayes & Ahrens, 1988; Adolf & Perfetti, 2014). Written language affords additional opportunities for children to hear and interact with this more sophisticated language. Children are exposed to words found in written
language when books or other print media are made available and shared with them. It is noteworthy that exposure to the language in books has been cited as an important activity in the development of children’s oral language and vocabulary skills (Marulis & Neuman, 2010; Mol, Bus, & deJong, 2009). In fact, one study found that sixth-grade children learned word meanings from a read aloud at the same rate that children typically learned words from written context. This suggests that listening to stories can be a rich source of word learning. Further, listening may substitute for some of the reading that children with learning disabilities do not do (Stahl, Richek, & Vandevier, 1991). The third way that words are learned is through wide reading. Swanborn and de Glopper (1999) examined the degree to which children learned unfamiliar words while they were reading. In their meta-analysis, these authors found that students spontaneously derived and learned the meaning of about 15 words of every 100 unknown words they encountered. Although several subject factors influenced incidental word learning (age, vocabulary size, grade level, and reading ability of students), Swanborn and de Glopper concluded that natural reading does have the potential to promote vocabulary growth. Here, however, it should be noted that incidental word learning could contribute to a child’s vocabulary knowledge. This knowledge, however, develops outside any definite system. Vygotsky (1987) argues, “Only within a system can a concept acquire conscious awareness and a voluntary nature.” Word mastery or owning a word is only possible if a word resides within an organized system of ideas. Further, Vygotsky notes that this system is of “extraordinary importance… for the development of the child’s thinking.” Thus, relying solely on incidental word learning can support the development of
everyday concepts but it neglects the decisive role that instruction plays in determining the entire fate of the child’s mental development (Vygotsky, 1987).

My analysis of the research literature yielded several studies that help to substantiate the collective knowledge base of how children learn words incidentally in the broad ways noted above, i.e., word learning via encountering new words through engaging in oral discussions, listening to stories, and wide reading experiences. Each of the studies referenced in this review has been cited many times; each is included because of its impact on the field’s understanding of how word knowledge grows through indirect means. First, Hoff (2003) examined the role that SES plays in vocabulary development. Specifically, Hoff looked at how different home environments and verbal interactions affected children’s vocabulary development. Next, to examine how listening to stories promotes vocabulary growth, Elley (1989) conducted a study addressing how different approaches to story reading affect word learning. Many studies since Elley’s seminal work have examined word learning using read alouds (for promoting text based discussions about words by Santoro, Chard, Howard, & Baker, 2008; with struggling readers to access and comprehend complex informational text by Santoro, Baker, Fien, Smith, & Chard, 2016; to determine how different read aloud strategies affected vocabulary growth by Silverman, 2007; for exposing children to the complex language in stories by Cunningham, 2005; to compare three read aloud styles on vocabulary acquisition and comprehension by Brabham & Lynch-Brown, 2002; with scientific vocabulary with preschoolers by Leung, 2008; using read alouds with preschoolers with limited vocabularies by Hargrave & Senechal, 2000). Finally, a study by Nagy, Herman,
and Anderson (1985) reflects early work in the field relative to the impact that independent reading has on vocabulary development. As examples of incidental word learning, these studies will be described in detail in the following paragraphs.

**Learning Words through Conversational Episodes.** Talking to children matters. Language interactions experienced by children in home and school environments have been examined for many years confirming that children’s early language experiences are related to vocabulary and language growth (Hoff, 2003, 2013; Huttenlocker, Waterfall, Vasilyeva, Vevea, & Hedges, 2010; Pan, Rowe, Singer, & Snow, 2005; Rowe, 2012; Song, Spier, & Tamis-LeMonda, 2014; Bowers & Vasilyeva, 2010). Although many studies have contributed to our understanding of how children learn words through engaging in oral discussions, work by Hoff (2003) is worthy of including here. This particular study has been referenced numerous times in the literature. Cited over 1100 times, it further adds to our understanding of the critical importance of early language interactions for building vocabulary particularly for children from lower SES environments.

Family socioeconomic status is closely tied to many aspects of child development, with vocabulary being one of these critical areas. Children from higher SES homes build their vocabularies at faster rates than children in lower SES homes. Hoff (2003) sought to discover whether differences in children’s vocabulary development across SES groups could be attributed to differences in their language-learning experiences. In looking more closely at how SES influenced early vocabulary development, Hoff discovered that maternal speech was a key predictor of word knowledge.
Hoff (2003) analyzed language interactions for sixty-three mother-child pairs. Thirty-three of the pairs were from high SES families where both parents were college educated. The remaining 30 mother-child pairs were mid-SES families in which both parents were high school graduates but had no education beyond high school other than technical training. All mothers were native English speakers, with English being the only language spoken in the home. Children ranged from 16 to 31 months old. For the study, verbal interactions between mothers and children were video recorded twice, 10 weeks apart. Conversations occurred as mothers got children dressed for the day, fed them breakfast, and played with an experimenter-provided set of toys. Average sessions lasted 43 minutes. Transcripts of mother-child interactions were analyzed using Systematic Analysis of Language Transcripts (SALT) software. Associations between maternal speech and children’s language were tested with correlations and multiple regression analyses. Total number of utterances was calculated as well as linguistic properties (number of word types and mean length of utterance). Additionally, the number of utterances in episodes of joint attention and the number of topic-continuing replies were documented. These data were collected and analyzed on maternal speech as well as children’s vocabulary across the two sessions. No SES-related differences were noted in the number of word types produced by children at Time 1. The difference between the number of word types produced at Time 1 and Time 2, however, was significant for both groups. Hoff noted that although the groups of children started at equivalent levels and grew in vocabulary from Time 1 to Time 2, children’s vocabularies grew at different rates. Data from the study were analyzed to determine why this was so.
Several assumptions were tested in the study to tease apart the relationship between SES and children’s word knowledge. First, Hoff (2003) found that a child’s vocabulary was, in fact, associated with SES. Children with higher vocabulary scores for Time 2 in the study were from higher SES homes, with a significant 5% of the variance in child vocabulary coming from SES. Next, there was a connection between vocabulary and maternal speech heard by the children over the course of the study. High SES mothers produced more utterances (*p<.05) and more word types (**p<.01); had higher mean-length-of-utterances (*p<.05); and included more topic-continuing replies (**p<.01) when engaging with their children than did the mid-SES mothers in the study. Thus, measures of maternal speech were significantly associated with SES. Third, maternal speech was related to a child’s vocabulary. Children’s vocabulary was stronger if mothers used longer sentences when talking with children. Mean length of utterance by mothers was a significant predictor of children’s vocabulary, accounting for 22% of variance in child vocabulary. Last, when birth order and maternal speech were eliminated from the model, only a non-significant percent of the variance (1%) in child vocabulary growth was attributed to SES.

Hoff (2003) concluded that SES does affect child language but perhaps there are other factors at play in the model. For example, the quantity, lexical richness, and sentence complexity of mothers’ speech with their children varied across the two SES groups. Hoff noted that this could mean that parents from different social strata may hold different beliefs “about the value and appropriateness of talking to children or the desirability of having a talkative child.” SES may also be associated with the amount of
time available for the kind of parent-child interactions that promote vocabulary growth. Additionally, children who heard longer utterances built productive vocabularies more quickly than children who heard shorter utterances. Length of utterance aside, however, the mothers in this study who spoke longer utterances used richer vocabulary thereby providing children with opportunities to hear more words that are different. Longer utterances may provide more information about word meaning because longer utterances often include discussions of word meaning, which goes beyond just providing word labels. Longer utterances also provide richer and more varied syntactic sentence patterns, which gives children even more information about word meanings. In sum, this study strongly suggested that the style of language among high SES mothers influenced the way they talked to their children which ultimately affected the rate at which their children built productive vocabularies. It was not so much the fact that mothers were from one SES group or another, rather, what seemed to matter was the length and type of exchanges that occurred between mothers and children that ultimately affected children’s vocabularies.

As Hoff (2003) studied environments in which children learn words, she found that there is great potential for vocabulary development as children engage in everyday exchanges with others. Children learn words from being in environments where others interact with them. Words are never formally introduced to a child in a systematic way; rather, as a child moves through daily activities, he hears words being used by others and then, using what he has heard as a model, may begin to experiment with those words to express ideas. Even though, as Vygotsky (1987) notes, “the use of the general word does
not in any sense presuppose the mastery of abstract thinking – p 16,’’ these everyday experiences are important as children build proficiency with language. Vygotsky notes that spontaneous concepts set the stage for the development of scientific concepts but that this journey takes a “complex and twisting path” that, over time and with many exposures, ends in knowing a word and all of its nuanced meanings. This study did not address or include a measure for gauging the development of scientific concepts. Rather, Hoff was interested in understanding how mother-child interactions across different SES environments affected children’s vocabulary growth.

Learning Words by Listening to Stories. Although engaging in oral exchanges with others can be an effective tool for word learning, studies also suggest that words can be learned as children listen to stories. In fact, it has been argued that reading aloud to children is the most important activity for developing the knowledge that is necessary to succeed in reading (Cunningham, 2005). Several studies suggest that read alouds promote word knowledge. Robbins and Ehri (1994), Feitelson, Kita, and Goldstein (1986), and Eller, Pappas, and Brown (1988) reported that listening to stories does contribute to kindergartners’ and first graders’ vocabularies. Baker, Santoro, Chard, Fien, Park, and Otterstedt (2013) and Baker, Chard, Santoro, Otterstedt, and Gau (2006) noted that read aloud intervention lessons which included explicit instruction helped improve vocabulary and comprehension for first grade students. Biemiller and Boote (2006) concluded that in the 13 studies they reviewed of vocabulary development with younger children, all of them featured storybook reading as the foundation of the instructional design. Many other researchers document the positive effects of read alouds on children’s vocabulary
knowledge (Beck, McKeown, & Kucan, 2002; DeTemple & Snow, 2003; Brabham & Lynch-Brown, 2002; Senechal, 1997; Sharif, Ozuah, Dinkevich, & Mulvihill, 2003).

Included here, however, is a study cited in the literature over 1000 times. Elley (1989) conducted two experiments exploring how different approaches to story reading affected students’ incidental word learning. In the first experiment, 157 7-year old children heard the same story, *Gumdrop at Sea* by Val Brio (1983), read aloud by a classroom teacher three times over the course of one week. The guiding hypothesis of the study was that children would learn the meanings of many new words that they heard in stories read aloud. Twenty vocabulary words, unknown by the target population, were the focus of the intervention. While reading, the teacher provided no elaboration or explanations for the 20 words selected from the text. Word mastery was measured by a multiple-choice test. Children either selected a picture that represented the vocabulary word or selected a synonym for a vocabulary word. At posttest, six word-related variables were analyzed. They included number of text occurrences, number of times each word was pictured in the story, helpfulness of verbal meaning cues, importance of the word to the development of the plot, vividness, and the likely familiarity of the concept represented by the word. Data collected at the end of the study indicated that children knew more target words on the posttest than on the pretest with a mean increase of 15.4 percent overall. The typical child learned about three words that were not known before the read alouds and this without any attempted explanation by teachers. Low-scoring students gained at least as much in vocabulary knowledge as their more knowledgeable peers. Of the 20 target words, those most readily learned were ones for
which the surrounding context was helpful, or those that occurred more than once in the story, or those that had picture support. Elley’s results in this first experiment suggest that read alouds are a potential source for learning vocabulary and that certain features of texts may help to promote word learning. Specifically, word learning appears to be greater when context cues help children figure out word meanings, when words are repeated in the story, and when pictures for words or concepts are included in the text.

To further tease apart how listening to stories has the potential to enhance vocabulary knowledge, two different stories, *Rapscallion Jones* by James Marshall (1983) and *The White Crane* by Helen Smith (1983), were included in Elley’s second experiment. Word meanings for 36 words, taken from the two stories, were assessed via a multiple-choice test. Similar to Elley’s first experiment, the multiple choice questions were pictorial items or verbal synonym items. One hundred twenty-seven 8-year old children heard each story read aloud three times over a period of seven days. The children were divided into three groups for the teacher read alouds. One group heard stories with word elaborated definitions; one group heard stories with no word elaboration; the third group heard neither of the stories used in the study. Results of the study showed that, for the first story, the mean vocabulary gain for students who heard the read aloud with the word explanations was 39.9 percent. Vocabulary gain for students who did not hear word meanings was 14.8 percent. For the second story, results were less dramatic. The mean vocabulary gain incorporating word meanings was 17.1 percent; with no word elaboration, the gain was 15 percent. Delayed posttests, using the same multiple choice assessment items, were administered 3 months after this second experiment. Although
there was a decline in word knowledge, Elley describes the declines as “an almost negligible 2-3 percent.” This study supports the notion that children do learn words when they hear stories read aloud. However, teachers’ enhanced explanations of word meanings as words are encountered in the stories can increase these vocabulary gains, depending on the text selected. In this second study, more supportive contexts where words were explained and elaborated upon provided learners with additional information about the words, thereby supporting word learning.

As he explored children’s word learning, Elley (1989) focused on teacher moves during read alouds. In his experiments, teachers did or did not elaborate on word meanings in texts read to students to determine which teacher action was more successful in promoting word learning. Elley did not discuss the development of word knowledge in terms of Vygotsky’s spontaneous and scientific concepts. However, Elley’s investigation of word learning via story reading suggests that he privileges the development of spontaneous concepts. According to Vygotsky, spontaneous concepts are formed during a child’s practical activity (here during book reading) through interaction with others in everyday life. It is in these social situations that spontaneous concepts begin their development. The degree to which a child’s needs are being met, here to support more sophisticated word use, determines whether concept formation will be distorted, (Blunden, 2011) what Vygotsky labels as “partial or faulty understanding of word meanings.” In Elley’s experiments, word knowledge was acquired outside the context of explicit instruction. Words were not introduced to the seven and eight-year old children in a systematic fashion. In Elley’s first experiment, children heard words embedded in a
story and then used information from life experiences to figure out what a word meant in that story. In the second experiment, teachers explained meanings of target words as they occurred in a story. Children had the opportunity to use the information provided to build on what they may have already known about a particular word’s meaning. In both experiments, a child’s prior experience with a word influenced whether or not the child learned that word. Experiences and understandings of concepts, unique to each child, influence depth of word knowledge. For example, calamity was one of the target words in Elley’s second experiment. A child’s understanding of calamity in a chosen text will be influenced by previous everyday experience with situations that would have been labeled by an adult as a calamity. Although a teacher’s explanation (as was provided in Elley’s second experiment) might provide additional information about calamity, children with prior concrete experience with calamity would be better equipped to make connections between those experiences and ones described in a selected text and will likely walk away from the task with a deeper understanding of calamity. Deep knowledge of a word empowers a child to use the word with precision in novel environments. That said, a child might describe an earthquake as a calamity, but the loss of a pet could also be a calamity. The child who uses the word flexibly owns the word and is able to think and share ideas using that word. The child has crossed over from “dead and empty verbal schemes” to “the mastery of living knowledge.” (p 170. Vygotsky)

As he evaluated word knowledge in both experiments, however, Elley (1989) asked children to demonstrate understanding via a multiple-choice test. Students were directed to select either a picture or a synonym for a word from several options. Although
widely used to evaluate concept mastery, multiple-choice items may not be the best tool to measure multifaceted word knowledge. Rather, in Elley’s study, multiple-choice tests were used to gauge whether or not a child was able to recall or recognize the meaning of a word among choices. This type of assessment may not provide information on how well a child is able to use a word flexibly across contexts. Vygotsky also notes that concept development is contingent on opportunities for children to connect with different dimensions of word knowledge through social interaction. Concept development “is supported by social experience in the context relevant to the domain of knowledge (Panofsky, John-Steiner, & Blackwell, 1993).” This implies that the learner works with others to construct knowledge jointly, in this case, to gain a deep understanding of new concepts presented in texts. Concept formation takes place as children use language to focus attention and articulate distinctive features of concepts. A multiple-choice assessment eliminates the possibility of building a deep understanding of a word through social exchanges and only provides information on whether a child is able to select or recognize a word’s meaning.

**Learning Words through Reading.** In addition to engaging in oral discussions and listening to stories, the third general way that children learn words incidentally is through reading texts on their own. Some authors suggest that reading volume is a prime contributor to individual differences in children’s vocabularies (Hayes, 1988; Hayes and Ahrens, 1988). Cunningham and Stanovich (2001) noted that most vocabulary is acquired outside of formal teaching and that print provides many word-learning opportunities. In fact, children’s books contain more rare words (627) than the adult speech of college
graduates (496). Additionally, Cunningham and Stanovich found profound differences in children’s vocabularies because of the number of minutes per day spent in reading. For example, the average child at the 90th percentile of reading ability reads almost two million words per year outside of school, more than 200 times more words than the child at the 10th percentile. The volume of reading combined with the lexical richness of print gives readers an advantage relative to quantity and quality of vocabulary words they encounter. Scott and Nagy (1994) summarize, “to promote the goal of learning a large number of different words, independent reading should be encouraged as a regular and significant part of each school day.”

One of the seminal studies examining vocabulary development through wide reading was conducted by Nagy, Herman, and Anderson (1985). The study was designed to determine if, during free reading time, incidental word learning from context was the major mode of vocabulary acquisition during the school years and if the volume of experience with written language was the major determinant of vocabulary growth. Cited in the literature over 1500 times, this study confirmed that incidental word learning from context accounts for a substantial proportion of the vocabulary growth that occurs during the school years. A group of 70 average and above-average achieving eighth grade students was recruited for the study. However, study results only included a sample of 57 students, those who had a complete data set. Students were randomly assigned to read either a spy narrative or an expository text on river systems. Students were also randomly assigned to one version of the vocabulary tasks used in the study.
Vocabulary was assessed using three different measures. Target vocabulary words, i.e., the 15 most difficult words from each text, were included on each of the assessments. Word difficulty for the 30 words was determined by grade level teachers and the word’s position on the Standard Frequency Index from Carroll, Davies, and Richman (1971). The first measure, a vocabulary checklist, was given to all students as a pretest. It consisted of 186 items and students were to indicate whether they knew each of the word meanings. Assessed words included the 30 target vocabulary words, 15 background knowledge words for each passage, 30 general vocabulary words, 32 decoding distractors (e.g., weast, robbit), 30 pseudo-derivatives (e.g., successment, desertitude), and 30 non-words (e.g., felinder, werpet). The vocabulary checklist was given to students three days before the main part of the study. The second measure was a story memory task. Used as one of the posttest measures, students were asked to indicate whether they “saw the word in the passage” or “had seen the word elsewhere” for each of the targeted vocabulary words. The third measure, a multiple-choice test, was also developed as a posttest to measure degrees of knowledge of word meanings for each of the 30 target words.

The main part of the study took place over a 2-day period during regular school hours. Small groups of students were assigned to testing rooms where trained researchers provided each student with one of the two reading passages. Students read passages then completed the story memory task where they answered questions about the target vocabulary. Students were not permitted to refer back to the text during the memory task. Next, students were assigned to a trained interviewer for an individual assessment on
meanings of the target words. Each interviewer had a 30-card deck of target words and
students were asked to provide meanings for each of the words. Student responses were
scored according to the following criteria: (a) zero points for no word knowledge, (b) one
point for minimal partial word knowledge, scored as Level 1; (c) two points for an
incomplete answer that displayed substantial correct knowledge, but was still missing an
important component of meaning, scored as Level 2; and (d) 3 points for a completely
correct answer, scored as Level 3. Last, students completed a multiple-choice test on
word meanings. Study results confirmed that a greater proportion of the target words
from a given passage were known by the students who had read that passage than by the
students who had not. For example, students who read the narrative selection knew 21%
of the words at a deep level (Level 3) but only 10% of words at this same level from the
expository selection. Additionally, on the multiple-choice measure, these students knew
59% of words from the narrative text but only 37% of words from the expository text.
Nagy et al. (1985) note that although the effect of learning vocabulary from context was
small, it was “statistically robust and consistent across types of text, methods of
measurement, and levels of scoring.” To conclude, then, the authors confirmed, “learning
vocabulary from written context can account for a large proportion of a child’s
vocabulary growth during the school years” with estimates of between 1,500 and 8,250
words learned per year based on extrapolations of data from the study.

As one example of how words are learned through incidental exposure, Nagy et.
al.’s (1985) work suggests and seems to confirm that wide reading does promote word
learning and this without intentional instruction on targeted vocabulary words. Like
Weisleder and Fernald’s (2013) and Elley’s (1989) studies, the perspective on word learning evidenced here seems to coincide with Vygotsky’s (1985) description of how spontaneous concepts develop. These concepts “develop primarily through the operation of the child’s own thought” with “their own internal history,” meaning that the concept is “saturated with the child’s rich personal experience.” In this study, as novel words were encountered in text, children used information from the text to arrive at plausible meanings for the words based on their experience and background knowledge. How well a child’s word meaning aligned with the author’s intent would ultimately affect how well the child comprehended the text.

To determine whether students’ word knowledge increased because of wide reading, several assessments were included in Nagy et al.’s (1985) study. On the first assessment, which was administered prior to the study, students marked whether they knew words presented. However, they did not have to substantiate their reasoning or explain meanings of words. Simply stated, students were given credit for recognizing words but further exploration of whether students could use the words in novel contexts was not included in the assessment. Similarly, in the story memory task, students marked whether words presented were seen in the selected passage or seen elsewhere. This, too, as a recognition task did not provide students with opportunities to demonstrate how well they could use the words in other situations. After completing the story memory task, students met with trained interviewers for individual interviewing on the meanings of target words. Of the four assessments used in the study, this task did require students to provide additional information about target words, beyond the level of recognition.
However, providing a definition for a word does not necessarily mean that students have a thorough grasp of a word’s meaning. Rather, Vygotsky notes, “the verbal definition begins the process of understanding a word.” The final assessment was a multiple-choice measure, which required students to select answers from an array of possibilities. As another recognition task, provisions were not made in this task to demonstrate a deeper understanding of word meanings.

**Summary**

A word is not just an assortment of letters separated from other words by spaces on a page. Knowing a word goes beyond just being familiar with its spelling or with its dictionary definition. A word captures an idea and word usage suggests that a word-user understands an idea or concept represented by a particular word. Vocabulary is the means by which we categorize and make sense of concepts that are often very complex. The studies included in this review reflect thinking about how words are learned. For students to build high quality representations of words so that they are able to use words skillfully and accurately whenever they wish, instruction must support word knowledge in such a way to meet this ambitious goal. As Vygotsky notes, some words are learned experientially in the absence of systematic instruction and other words are learned through explicit instruction. Each method has been discussed in this review, citing advantages and disadvantages of each. Karpov (2003) contends, however, that merging both types of word knowledge results in “a high level of mastery, broad transfer, and intentional use by students.” This research study has been designed to attempt to meet the challenge of combining fundamentally different types of word learning into an
intervention, informed by literature reviewed here, that provides students with opportunities to develop a rich storehouse of words that they own in listening, speaking, reading, and writing.
CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

As noted in Chapter 2, all concepts develop in one of two ways, via direct instruction or incidental exposure. According to Vygotsky (1987), an in depth understanding of concepts “plays a decisive role in determining the entire fate of the child’s mental development during the school age.” Although spontaneous and scientific concepts develop in unique ways, “an analogous relationship exists” between the two and “the development of spontaneous and scientific concepts are closely connected processes” (Vygotsky, 1987; John-Stener & Mahn, 1996). As noted in the literature review, proponents of word learning using direct instructional methods privilege the development of scientific concepts while proponents of incidental learning are partial to the development of spontaneous concepts. This study sought to bridge the connection between spontaneous and scientific concept development to support word learning. Hiebert and Kamil (2005) note that there is a need “to design classroom experiences that are multi-faceted, if students are to acquire new words and increase the depth of their word knowledge.” Further, there is a need for research on vocabulary in authentic school contexts (Blachowicz, Bates, & Cieply, 2015). This study responded to these concerns by examining the impact of engaging in guided conversations during vocabulary instruction where students had opportunities to talk about words and word meanings with others to explore nuances of word use and to refine understandings of words based on shared experiences. More specifically this study was guided by the following research question: Does an intervention designed to increase word knowledge by using discussion and writing as ways to help students make connections between lived experiences and
selected vocabulary improve students’ learning of that vocabulary? After engaging in guided discussions with peers using words selected from the district adopted reading series students wrote sentences to document understanding of word meanings, as permanent products of their thinking and for use as a tool to review word meanings. The hoped for outcome was that the sentences that students produced would demonstrate a high level of understanding of the word meanings. In order to fully explore the effects of the intervention, analyses included in Chapter 4 address how the intervention affected student performance on each of the posttest measures included in the study. Specifically, the analyses address the following questions: 1. Was the intervention linked to gains in the weekly multiple choice tests which accompany the Journeys reading series for vocabulary? 2. Was the intervention linked to gains in the weekly multiple choice tests which accompany the Journeys reading series for comprehension? 3. Was the intervention linked to gains in the sentence writing task at posttest? Details of the study are described in the following paragraphs.

**Setting and Participants**

**Research Site.** The research site was an elementary school in northeastern Pennsylvania servicing third through sixth grades. During the 2016-17 school year, there were five or six general education teachers for each grade level. Two special education teachers were assigned to the four grade levels in the building.

All teachers in the elementary school met Pennsylvania’s criteria for being highly qualified meaning that they held at least a bachelor’s degree, held a valid Pennsylvania teaching certificate, and demonstrated subject matter competency for the core content
area they teach. Teachers in the district averaged 10.92 years of classroom teaching experience. To gather additional demographic information, specific to this school building, the five teachers in the targeted grade level completed a survey on teaching experience, educational background, and attitudes toward teaching vocabulary. Survey results follow. During the 2016-17 school year, one teacher had been teaching for more than 15 years; the remaining teachers had been teaching for between 8 and 15 years. Three teachers taught fourth grade for 1 to 3 years; two had been assigned to fourth grade for between 8 and 15 years. Four teachers had experience in elementary grades other than fourth grade; one teacher’s experience was exclusive to fourth grade. All grade level teachers held a Master’s degree in one of the following areas: classroom technology, curriculum and instruction, or elementary education. All teachers indicated that they “enjoy teaching vocabulary.” Three of the five teachers agreed that vocabulary was not their strongest reading / ELA area to teach; two teachers considered themselves “master teachers” of vocabulary.

Approximately 122 students were enrolled at each grade level in the elementary school. There were approximately 474 students in the school building. Class sizes ranged from 23 to 25 students. Students were assigned to homerooms so that they were heterogeneously mixed by academic performance levels based on multiple end-of-year data sources from the previous school year. Forty-six percent of the students were male and approximately 54 percent were female. Overall, during the 2016-17 school year, 51.4 percent of the district’s students qualified for free or reduced lunch and 2.88 percent were English language learners. Special education students comprised 12.97 percent of the
school population. The 2015-2016 Pennsylvania System of School Assessment data for reading indicated that 64 percent of third grade students, 57 percent of fourth grade students, 64.5 percent of fifth grade students, and 57 percent of sixth grade students were proficient or advanced.

Participants. This study focused on fourth grade students who received reading instruction in general education classrooms and who were evaluated with curriculum-based assessments from the reading series. Fourth grade is the approximate time when vocabulary demands in text expand significantly beyond high frequency, predictable words (Mitchell, & Brady, 2013). As children move into the “reading to learn” stage, typically between the third and fourth grades, they require both fluent word recognition skills and an average or above average vocabulary to facilitate reading comprehension (Pullen, Tuckwiller, Ashworth, Lovelace, & Cash, 2011; Biemiller, 2006). Although high vocabulary levels do not guarantee high levels of reading comprehension, the absence of either word recognition or adequate word knowledge ensures a low level of reading comprehension. Many researchers hypothesize that the fourth grade slump, a sharp decline in reading scores that tends to occur between the third and fourth grades, particularly for low-income students, is actually the result of significant deficits in these students’ vocabularies.

During the 2016-17 school year, there were five sections of fourth grade. All fourth grade classrooms were self-contained meaning that one teacher was responsible to teach all subject areas to a single grade-level group of students. There were 121 students enrolled in the grade level. Twenty-two of the students had an Individualized Education
Program (IEP). One hundred ten students chose to participate in the study. Of the 110 students, 44 students were in the two intervention classrooms and 66 were in the three remaining classrooms, designated as control classrooms.

**Instructional Context**

**Current Instructional Practices.** The 2012 edition of the Houghton Mifflin Harcourt Journeys reading series was adopted by the district to implement its English-Language Arts written curriculum. The 2016-2017 school year was the district’s fourth year implementing the reading series. The Journeys reading series is aligned with the Common Core State Standards, ensuring that “students will have the solid support they need for college and career success” (Houghton Mifflin Harcourt Publishing Company, 2012). Fourth grade teachers had a 90-minute language arts block scheduled for reading and writing instruction. The yearlong reading series for fourth grade is divided into 6 separate Units; each Unit contains five Lessons; Lessons are divided into a 5-day Weekly Plan, with suggested whole group and small group activities. Each Lesson has a main reading selection and two additional shorter reading selections. These texts are used to develop skills in oral language, vocabulary, comprehension, fluency, and decoding. A grammar component is included in the Lesson where students work on sentence construction tasks. Weekly writing prompts are also connected to the weekly reading selections. Each writing prompt focuses on either a type of writing (creating a descriptive paragraph, narrative composition, or expository piece) or a particular writing skill (for example, including dialogue in a written piece).
Routines which include vocabulary instruction, the focus of this study, occurred on specific days in the Weekly plan. On Day 1, vocabulary words were introduced in a read-aloud selection containing the ten target words for the week. This text was a short 2-page selection, which teachers read aloud twice. First, teachers read the entire selection to model fluent reading and to check for comprehension. During the second reading, teachers were directed to “pause briefly to explain each highlighted vocabulary word and to discuss the meaning of each word as it is used in the read aloud.” Although Journeys did not specify time allotted for each portion of the daily lesson, this activity took approximately 10-12 minutes on Day 1. Also on Day 1, the series suggested that Vocabulary in Context Cards be introduced. These Cards provided student friendly definitions for the Lesson’s words. Three vocabulary activities were included on the Cards, as well, to allow students to “engage with the word”. One activity, What Does It Mean? provided a possible context for the target word. Specifically, for the target word comfort, students read, “When you comfort a person, you help that person to feel less bad.” The next activity, Think About It, encouraged students to think about an experience that could be described with the target word. For comfort, Think About It asked, “When did you comfort someone? Why did that person need your help?” The final activity, Talk It Over, directed students to engage in a writing task, often to make a list of examples of word usage. For comfort, students were directed to make a list of behaviors that comfort people and those that do not comfort. To be clear, student talk or discussion among peers was not incorporated into the Talk It Over activity, in spite of the title of the Card’s activity. Again, time allotments were not specified in curricular materials; however, work
with the Vocabulary in Context cards took approximately 15 minutes on Day 1. It is important to note that teachers’ manuals for Journeys indicated that some of these Activities could be incorporated into daily plans at other times during the week. When this occurred, though, was at the discretion of individual classroom teachers.

As outlined in the reading series, the main reading selection which contained all of the week’s vocabulary words was introduced for the first time on Day 2 of the lesson. It was shared in one of two ways, via AUDIO-TEXT CD or via teacher read aloud. However, some students had the option to read the selection independently. As the audio was played or the teacher read the selection aloud, students listened while following along in their texts. On Day 3, the weekly selection was read aloud again. Teachers were directed to stop the read aloud at specific points during the reading to ask questions that incorporated target vocabulary words. For example, for the vocabulary word positive, students listened to a chunk of text and teachers were directed to ask, “Why do you think Miss Franny asks if Opal is positive Winn-Dixie is a dog, not a bear?” For use on Day 3, question prompts were included for some but not all of the weekly vocabulary words introduced in the week’s reading selection.

During Day 4 of the weekly plan, vocabulary was included in each of the lesson plans one final time. Students were assigned a 2-page story to read independently. The text for the Day 4 reading selections included most, but not all ten, of the weekly vocabulary words. Typically seven to eight of the weekly words appeared in the short selection. Connections to other content areas, such as Social Studies or Science, or to poetry or other literature forms were common in these succinct reading selections.
Further discussion of the vocabulary words in the reading selection on Day 4 was at the discretion of the classroom teacher.

When the 5-Day plan was completed, Weekly Tests were administered to assess students’ reading progress with skills addressed in the Lesson. These pencil-paper assessments were designed to determine whether skills that were covered in lesson plans clustered around reading selections within a Lesson had been mastered. Weekly Tests were given to the entire class and took approximately 45 minutes to administer. They included items related to vocabulary, phonics, comprehension and written expression.

It should be noted that teachers in individual classrooms were allowed autonomy when executing Journeys’ reading lessons. Teachers had the prerogative to spend more or less time on each of the components included in the series. Since this study focused on a vocabulary intervention designed to reinforce students’ connections between spontaneous and scientific concepts, it was important to have a clear idea of how teachers “typically” supported word learning.

To get a clearer sense of how teachers enacted the vocabulary instruction suggested by the school’s reading series, I observed one vocabulary lesson in each of the fourth grade classrooms. I asked teachers to introduce words as they normally did when presenting vocabulary from the Journeys lesson to students for the first time. The ideas described here are my reflections based on those observations in each of the fourth grade classrooms. My field notes revealed several dominant themes as words were introduced. These themes included the following: first, teachers assumed that students had some knowledge of word pronunciations and word meanings prior to instruction; second,
teachers presented a limited number of examples of a word’s use as a foundation for learning the word; and, last, opportunities to discuss words and word meanings were absent in four of the five of classrooms.

**How Teachers Introduced Target Words.** One of the oldest findings in educational research is the strong relationship between vocabulary knowledge and reading comprehension (Stahl, 1999; Perfetti, 2010; Cain & Oakhill, 2011; Beck & Carpenter, 1986; Cunningham, 2005; Cunningham & Stanovich, 1997; Senechal, Oulette, & Rodney, 2006). To increase the likelihood that students would understand the vocabulary words embedded in the weekly reading selection so that they could comprehend the text, all fourth grade teachers participating in this study did introduce the vocabulary words for each of the weekly lessons to students. Four instructional practices were observed. First, teachers asked students to decode and pronounce the target vocabulary words. In some cases, students were successful; in other cases, students would have benefitted from hearing a model of a word’s correct pronunciation. For example, in one classroom the teacher wrote words on a mini white board and displayed the words to students. Each time a word was displayed, she asked, “Who can read this word?” and waited for students to respond. Only students who raised hands were called on. During this lesson, the students who volunteered were successful in decoding and pronouncing the words presented (*worthy, churning, swelled, situation, deserve*). It is uncertain, however, whether the students who did not volunteer were able to decode the words since the teacher only called on students who raised their hands. In another classroom, some of the students were not as successful in pronouncing words. One of the
weekly words was debut. As the words were presented in list form, the teacher asked, “What’s the first word on the list?” referring to debut. Two students volunteered and attempted to pronounce the word, “/dee/ /butt/” and “/dee/ /boo/”, neither of which was the correct phonological representation of the word. A third student landed on the correct pronunciation and the teacher did affirm the correct response. These examples suggest that some students may, in fact, have some familiarity with words. Specifically, they may have heard particular words before and so know how to pronounce them. However, the goal of instruction is to ensure that all students are well equipped to interact with words as they encounter or read them in continuous text. Part of knowing a word is being able to successfully pronounce the word so that ideas communicated with the word can be understood by others.

Second, in three of the classrooms, teachers asked if students knew any of the weekly words, without providing any information about the words. For example, one teacher referred to the list of the current week’s words in the anthology and then listed the vocabulary words on the board. First, he surveyed students asking, “Do you know the words there?” Eight of the 21 students present in the class raised their hands indicating that they had some familiarity with at least one of the words. The teacher then surveyed the class and noted how many students were familiar with each of the words listed. Each word received a different score based on the number of students who indicated they knew the words. So, for example, of the 21 students present, 7 students indicated they knew presence; 20 students knew disbelief; 16 students knew tempted. The teacher, however, did not ask students to share what they knew about individual words so it was unclear
whether students did, in fact, know something about any of the words presented or whether they could provide a definition for any of the words.

Third, teachers asked students to provide definitions for words. This occurred in 4 of the 5 classrooms. In one classroom, one of the target words was stubborn. It appeared as if the teacher felt students were familiar with this word and she asked volunteers to provide definitions. Students offered the following responses: “Not doing something well?” “Not listening to others?” “Grumpy.” “It doesn’t change.” The teacher then clarified, offering the definition included on the Vocabulary in Context Card, “Do you mean lasting and not easily changed?” In this exchange it was difficult to tell how well individual students understood stubborn, based on their responses. Nonetheless, the teacher provided the definition so that all students could begin to move toward a common understanding of the word. This example, then, confirms that teacher assumptions about student familiarity with some words, as seemingly common as stubborn, may be inaccurate.

Fourth, students were asked to share aloud sentences which incorporated one of the weekly words. Teachers did not provide direction beyond, “Who can use this word in a sentence?” They then waited for student volunteers. This occurred in 3 of the 5 classrooms. Some student responses, with the target words in italics, included the following: “I’m stubborn that I don’t want to leave but I have to.” “My trophy is a debut.” “My dad almost swelled.” Although some of these sentences had the potential to be refined to clarify a word’s meaning, none of the teachers paused to do so. In looking at, “My trophy is a debut,” it might be concluded that the student attempted to describe
the time when he received his first trophy, approaching the definition of *debut* as “the first public show” (definition provided on the Vocabulary in Context Card). However, absent teacher clarification, the sentence reflected, at best, an emerging understanding of the word’s meaning and a limited understanding of how to use the word correctly in a sentence.

One interpretation of these four instructional practices is that teachers who participated in this study assumed that at least some students had knowledge of at least some of the words that were highlighted for instruction. However, without conducting a stimulated recall interview, it is impossible to determine whether teachers were assuming their students’ word knowledge or assessing it. In any case, however, during the three-week study, teachers in intervention classrooms were provided with a word learning protocol which focused on providing student-friendly definitions first in the instructional sequence so that any possible misconceptions of word meanings could be clarified.

**What Examples of a Word’s Use the Teachers Provided.** Research on word learning confirms that children benefit from multiple exposures to words that they are expected to learn (Bolger, Balass, Landen, & Perfetti, 2008; McKeown, Beck, Omanson, & Pople, 1985; Marulis & Neuman, 2010). Although there is no precise, optimal number of exposures to a word that ensures a word is learned, it is clear that word meanings develop over time as children encounter words several times in varied contexts. As was evidenced during the classroom observations prior to the intervention, although all teachers provided examples of a word’s use, the number of examples was limited, often by the teaching resources used. For example, teachers in four of the classrooms
introduced the words in one of two ways. First, two teachers used the Vocabulary in Context Cards to introduce the weekly words. The front of each card included the target word along with an illustration and sentence showing how the word could be used. Sentences, here with the target word in italics, included the word’s definition as in, “Moviemakers use cameras to focus, or concentrate, on each film shot;” or sentences provided less support for students as in, “Moviemakers show clips of exciting scenes to promote their movies.” Using the Cards, one teacher asked for a student volunteer to read the sentence aloud. She then asked for another volunteer to explain the word “in your own words.” For the target word, hauling, the sentence on the Vocabulary in Context Card read, “When a band is traveling, workers are hauling equipment from city to city.” Students then took stabs at the word’s meaning as follows: “Bringing it?” “Taking it?” “Carrying it?” “Pushing or pulling it?” Although students were beginning to figure out an acceptable meaning for hauling, missing from their definitions was the idea that hauling includes exertion. So, for example, you wouldn’t haul something that was lightweight and easy to carry. Students, therefore, were expected to figure out what a word meant based on a single scenario but, during my observations, received little clarification from the teachers that their definitions were accurate.

Instead of using the Vocabulary in Context Cards to introduce words, two of the teachers chose to use the 2-page story provided in the anthology or available electronically from Think Central for this same purpose. All of the weekly vocabulary words were embedded in this 2-page text. In both classrooms, teachers read the selection aloud to students, stopping when they encountered a vocabulary word included in the
weekly reading lesson and targeted for instruction. For example, one 2-page story read, “Jessica had just come out of her building early Saturday morning when she saw Alex running toward her. ‘Help!’ called Alex. ‘What is it?’ asked Jessica with an *innocent* look.” One of the teachers then asked students what they thought *innocent* meant and emphasized using context clues as a word learning strategy. Students provided ideas, based on the story, as follows: “Scared?” “Tired?” “Worried?” Notice that all students who volunteered to figure out the meaning of *innocent* asked about, rather than stated, the word’s possible meaning. In this particular example, the context was not supportive enough to figure out what *innocent* might mean so the use of context clues, as directed by the teacher, was of limited benefit for word learning. After allowing individual students to suggest meanings, the teacher provided the meaning, “blameless or with good intentions” from the Vocabulary in Context Card. It was unclear, however, whether this definition supported students’ word mastery. There was no further conversation around the word or additional opportunities to engage with the word and the teacher continued reading the next portion of text until she encountered the next vocabulary word. This same pattern typified instruction in the second teacher’s classroom that used the 2-page story to introduce weekly words. The short reading selection was introduced and the teacher paused when each vocabulary appeared in the selection. Student guessing at word meanings continued with the teacher offering the definition provided on the Vocabulary in Context Card if student definitions missed the mark.

In sum, these observational data confirmed that the fourth grade teachers involved in this research effort, while introducing words, provided limited opportunities for
students to hear and engage with the words. Although it is clear that these lessons focused on students’ first introductions to the weekly words and that the students would be seeing, hearing, and working with the words during subsequent lessons, it is also clear that many students were moving forward with fragmented knowledge of a word’s meaning and that initial teaching sequences were punctuated by a limited number of opportunities for students to hear and interact with the targeted vocabulary words. If, as the research suggests, multiple opportunities to hear and interact with words supports word learning, it would be important to include many ways for students to engage with words they are being required to learn and use.

In contrast to the limited exposures to words noted in classroom observations here, the word learning protocol used to introduce words in the intervention classrooms, and which is appended to this document, offered a minimum of 15 opportunities for students to connect with each vocabulary word. Each protocol included student friendly definitions for each of the weekly words, a vignette, as well as varied mini scenarios which provided students with an assortment of ways a particular word could be used. Because the word learning protocol was used when words were introduced to students, students had the chance to continue to build and refine word knowledge throughout the week as they encountered words in the weekly reading selections and in discussions focused on word meanings beyond what was provided when words were introduced.

**How Teachers Discussed Word Meanings.** The third theme apparent from classroom observations conducted prior to the intervention was the absence of discussion of words and their meanings. Save for a single classroom, no discussion of word
meanings between the teachers and students or among students was observed when words were initially introduced. According to Lawrence, Crosson, Pare-Blagoev, and Snow (2015), rather little discussion goes on in the typical U.S. classroom – less than two minutes per hour on average. Yet, discussion is one approach that can be used to meet conditions known to support vocabulary learning. These conditions include introducing words in semantically rich contexts, providing opportunities for frequent exposures to target words, and allowing students to use words in authentic communicative contexts.

In four of the five classrooms, teachers introduced words as noted earlier. Instruction was punctuated by reading the vocabulary words or sentences which contained the words and then encouraging and allowing students to guess at plausible word meanings that would fit the particular context. Word meanings were then confirmed or tweaked by the teachers so that they were aligned with the target definition. However, in one classroom, students were encouraged to talk with partners to discuss what each word might mean based on the word’s use in a 2-page reading selection used as words were introduced to students for the first time. The teacher allowed students to discuss words at their table groups. In this classroom, student desks were arranged in groups of 4 or 5 to facilitate discussion. From the 2-page story, “The man towered over the little boy.” The teacher repeated, “towered… what do you think towered means? Turn and talk to your partners.” Overheard were the following: “Encountered.” “Looked.” The teacher interrupted conversations, “Can you use context clues to help?” The students continued, “Looked?” “Watched?” The teacher repeated the sentence from the story and asked, “Can you connect towered to tower? They are high, right?” After students engaged in small
group discussions, though, no formal or universal definition was provided for them during the observation period. The turn and talk routine, however, appeared to be familiar to students, so one might hypothesize that discussing word meanings was typically incorporated in vocabulary lessons in this classroom. This suggested that the teacher likely valued discussing words as a tool to help students begin to understand how words could be used. During the brief turn and talk episodes, on the day of my classroom observation, conversations were guided by the teacher and remained focused on discussing word meanings, but, again, no consensus definitions were provided to students.

Classroom discussion is often described by contrasting it to teacher monologues, here teachers providing definitions to students, or the Initiation-Response-Evaluation (IRE) exchanges that are prevalent in many classrooms (Hattie, 2012; Applebee et al., 2003; Gamoran & Nystrand, 1991). In fact, there was evidence of IRE exchanges in my initial classroom observations. Noted earlier, students often guessed at word meanings with the expectation that teachers would let the students know if definitions were acceptable. Based on my review of the literature, however, I realized the importance of collaborative discussion for promoting word learning and intentionally included many structured opportunities for students to talk about words, via the word learning protocol, in the intervention classrooms. Specifically, the mini scenarios and vignettes included in the protocol provided students with ways to talk about words and to explore how the words were used in different situations. As students were discussing words, teachers in
intervention classrooms were expected and directed, as part of the intervention, to monitor conversations to keep discussions on track.

**Intervention.** With a focus on vocabulary instruction, the intervention period lasted for approximately three weeks, specifically the time it took to introduce three reading Lessons, each containing 10 vocabulary words, from the district adopted reading series. Students in control classrooms followed lesson plans outlined in teachers’ manuals provided in the district’s reading program in a business as usual format for introducing vocabulary words for each reading selection. Instruction for students in intervention classrooms included interactions with words in contexts designed so that students were able to begin to make connections between spontaneous and scientific concepts.

Vocabulary research indicates that multiple exposures to words used in different contexts help students learn them better than repeated exposures that are not varied (Bolger, Balass, Landen, & Perfetti, 2008), and understanding improves with each novel exposure (McKeown, Beck, Omanson, & Pople, 1985). There is a greater likelihood that students will internalize new academic vocabulary and add words to their lexicons if they are set up to use them in class, by producing them orally and in their writing (Lesaux, Kieffer, Faller, & Kelley, 2010). Tasks, which included discussion and writing, were included in the vocabulary intervention.

**Vocabulary instruction.** So that students in the intervention classrooms received more exposures to vocabulary words and to support word learning via interactive and responsive contexts, students engaged with vocabulary words, beyond what was specified in the Journeys’ reading series and on the Vocabulary in Context Cards on Day 1 of the
Although words were introduced to students in reading selections, Adams (1990) suggests, new words are interpretable only if they are explained in terms of old words. The quality of the student friendly definitions, therefore, influences how well students understand words based on definitions provided. A student’s ability to access background knowledge also affects how well he will understand each new word (Carrell, 1983). Providing students with extended and varied opportunities to interact with words and allowing them to connect words to familiar environments and everyday concepts increases word knowledge.

On Day 1, as noted earlier, students in all classrooms were introduced to vocabulary words connected to the weekly Lesson. Students in control classrooms interacted with words via the vocabulary teaching routine in Journeys’ and by using the protocol for Vocabulary in Context Cards. Students in intervention classrooms, however, were exposed to words via a researcher-developed protocol. The protocol was designed to provide students with enhanced opportunities to engage with words. It could be considered ‘low impact’ given that it did not require significant changes in the amount of time already devoted to introducing weekly vocabulary words. The word learning protocol was structured to provide a minimum of 15 exposures to each target word and included both receptive and expressive tasks. Student friendly definitions were provided for all words and students in these classrooms had the option to record student friendly definitions in a Word Journal, created for use during the intervention period. After words were introduced, students collaborated in small groups to discuss how words might ‘fit’ into specific familiar environments. For example, prepared could be an action that occurs
at home as in, “I prepared for bed by getting on my pajamas and brushing my teeth; then I was ready for my favorite bedtime story.” Observes is an action that could occur at school in conjunction with a science experiment as in, “Stan observes while his teacher pours the right amount of liquid in a beaker so that, by watching, he’ll be able to successfully replicate the experiment.” Classroom teachers were directed to monitor student conversations as individual words were discussed. A sample word learning protocol appears Appendix A.

**Sentence writing.** A sentence creation task was used in this study as the second instructional strategy for teaching vocabulary. In order to master new vocabulary, students need multiple opportunities to see, hear, and write the new words (Padak, Bromley, Rasinski, & Newton, 2012). According to Flinspach, Scott, and Vevea (2010) writing is an action or behavior that can demonstrate what it means to know a word and these authors contend that vocabulary knowledge and growth can be studied through writing. By accurately using a new word in writing, students demonstrate that they have a sound understanding of a word’s definition and usage.

After the discussion activities, students in intervention classrooms were assigned partners to continue to discuss the words and to work to incorporate the words into meaningful sentences. Partners recorded sentences in their Word Journals. After student partners discussed and created their sentences, they shared work with another student group. Students were encouraged to edit or revise sentences based on peer feedback. As they discussed words and wrote sentences, they had opportunities to make connections between target words and real-world contexts to expand word knowledge (Pullen et al.,...
During the sentence writing task, students were able to begin to connect what might be familiar (everyday concepts) to the words they were learning (scientific concepts). As time allowed, groups were asked to share sample sentences with the entire class using a Random Reporter strategy. Random Reporter is a best practice instructional strategy teachers can use to increase student discourse and improve student engagement. During Random Reporter, the teacher first provided students with an opportunity to talk with a partner or group, and then selected a student (or students) to share out to the whole class using a random method of selection. The classroom teacher, researcher and classmates provided additional feedback so that sentences were refined but only if students chose to revise their work. Both the discussion and sentence writing exercises took approximately 20 minutes on Day 1 of the Lesson. While students in intervention classrooms were discussing the words and using the words in their writing, students in control classrooms were exposed to the new words as noted, as described earlier, in the Journeys reading series using the 2-page introductory reading selection or the Vocabulary in Context cards.

On Day 1 of the lesson, students in the intervention classrooms created sentences for approximately seven of the ten targeted vocabulary words, as time allowed. On Day 2 of the lesson, the students were paired with different classmates, based on teacher knowledge of student work groups, to discuss the vocabulary words and to write meaningful sentences in Word Journals for the remaining week’s words. Students referred to student friendly definitions from either their Word Journals or from the Vocabulary in Context Cards.
For the first weekly reading selection, I provided support and feedback for students during vocabulary instruction. For the second and third weekly selections, the classroom teachers provided support to students as necessary. I was, however, available to address questions related to the intervention for introducing the vocabulary in the second and third weekly reading selections.

Data Collection and Analysis

Assumptions and Rationale for a Quantitative Design. Quantitative research is primarily concerned with demonstrating cause-effect relationships. The basic intent of experimental design is to test the impact of a treatment (Fraenkel, Wallen, & Hyun, 2014). Quantitative methods allow researchers to compare data in systematic ways to generalize study results across broader populations. I used a quasi-experimental design to examine the degree to which a novel approach to vocabulary instruction using words targeted in the district adopted reading series affected student performance on vocabulary assessment measures. Students in the experimental classrooms engaged in discussion and writing activities designed to provide additional opportunities to interact with vocabulary words in meaningful ways in order to bridge the gap between the students’ everyday lived experiences and the development of scientific concepts. My hypothesis was that when students have extended opportunities to work with words, beyond those specified by the curricular materials, word learning would improve. The anticipated outcome was that classrooms of students, assigned to the treatment condition, would score higher on measures of vocabulary than classrooms of students in the control group.
This study followed a quasi-experimental design and included both intervention and control groups. Prior to intervention, pre-test data was collected for all students. Classrooms were assigned to intervention or control conditions by the building principal. At the end of the intervention period, post-test data was collected for all students. Analysis of the data included in Chapter 4 documents the effects of the intervention.

**Baseline Data Collection.** Three measures were used to gather baseline data on students’ word knowledge prior to the intervention. Baseline data were collected during the 2 weeks prior to the intervention. The baseline measures included the comprehension and vocabulary assessment results from weekly reading tests for two lessons prior to the intervention, a researcher designed sentence creation task, and the TOSCRF-2: Test of Silent Contextual Reading Fluency-Second Edition (Hammill, Wiederholt, & Allen, 2014). First, weekly reading tests are administered at the end of every lesson. Although weekly tests are divided into several sections, student performance data only on the comprehension and vocabulary sections were reviewed for this study. Second, all students created original sentences for the 30 words (ten words per weekly reading selection) that were the focus for instruction during the intervention period. Last, the TOSCRF-2 (Hammill, et al., 2014) was administered to all students participating in the study. Each of these data sources is explained in detail in the following paragraphs.

**Curriculum-based reading tests.** Most school districts rely on curriculum-based assessments to provide measures of reading performance. These assessments accompany the district adopted reading series and are often referred to as weekly tests. For baseline, data from the two weekly tests administered just prior to the intervention period was
summarized, with a focus on the comprehension and vocabulary test items. These data provided a measure of student mastery of comprehension and vocabulary from the reading selections and served as one indicator of student understanding of the focus skill for the given selection, i.e., main idea, character development, among others, along with the effectiveness of vocabulary instruction as suggested in curricular materials as implemented by the classroom teacher. Although students with IEPs were included in general education classrooms for reading instruction during at least a portion of the language arts block, several of these students were assessed differently. The general education teacher typically administered the vocabulary section of the weekly test to all students. Based on the student’s IEP, however, the comprehension section of the weekly test may have been administered in a learning support classroom with the necessary accommodations specified in the IEP. Therefore, some students with IEPs had incomplete data sets and were missing a comprehension score. Nonetheless, all available data were included in the analysis.

Weekly assessments demonstrated parallel forms / alternative forms of reliability since different versions of the assessment tool were given over the course of the intervention. Weekly tests contained items that probed the same constructs and skills. Therefore, scores from these assessments were correlated to evaluate consistency of results. Weekly tests demonstrated internal validity in that a relationship between the intervention and student outcomes was expected. In sum, the intervention had the potential to affect student vocabulary growth, the item of interest for this study.
**Sentence writing task.** The sentence creation task was used as a pretest measure as well as part of the instructional intervention. For the pretest, the researcher provided a script for all fourth-grade teachers which explained for students how to write meaningful sentences. The script appears in Appendix B. A meaningful sentence was one that used context clues and/or synonyms to convey the meaning of a vocabulary word in a sentence. Students were provided with examples and non-examples of meaningful sentences and had the opportunity to discuss criteria for creating meaningful sentences. Students were encouraged to be creative and, most importantly, to demonstrate a robust understanding of word meanings in sentences.

For baseline data, all students were asked to write meaningful sentences for each of the 30 vocabulary words that would be taught in the three upcoming reading selections in the reading series. These 30 words were the focus of the intervention study. Students’ sentences were scored by a scoring team. A graduate student, a former fourth-grade teacher who is currently assigned to fifth-grade English Language, and I were members of the scoring team. In order to establish inner-rater reliability, ten student work samples were randomly selected from the baseline work sample. Each member of the scoring team independently scored student work. Individual student scores were then compared to ensure that scoring was consistent. Student work was collaboratively scored until the scoring team reached 85-90% agreement. Sentences were evaluated using a researcher created 3-point rubric and the following criteria were used to evaluate each of the sentences. The target word in this example is *famished*. Zero points for a sentence that provided no or very limited information as to the meaning target vocabulary word.
Example: I am famished. One point for the word’s use in a sentence that provided some, although limited information about the meaning of the target word. Example: I am famished every night before dinner. Two points for a sentence that reflected a clear understanding of the target word. Example: I was famished since I had not eaten anything for three days. Half points were also awarded based on criteria noted here. As a baseline metric, these data provided indicators for how well students knew words prior to instruction. It should be noted that of the 30 words targeted for intervention, six had multiple meanings. If a student’s sentence reflected an alternate meaning, other than the one specified in the weekly reading selection, no points were awarded on either the pretest or the posttest. For example, one of the polysemous words was possessions, meaning ‘things that you own.’ So if a student wrote, “The Eagles won the game and they had more possessions than the Broncos,” no points were awarded since possessions in this sentence does not align with the target definition for the word in the weekly reading selection.

**TOSCRF-2 (Hammill, et al., 2014).** The TOSCRF-2 was the third measure used to gather pre-test data for this study. I was interested in knowing whether there was a statistical difference in general vocabulary knowledge among classrooms participating in the study. As this third measure, the TOSCRF-2 yields three types of normative scores: age and grade equivalents, percentile ranks, and index scores. The index score is a type of a standard score that has a mean of 100 and a standard deviation of 15. The index scores were used in the data analysis for this study. I administered the TOSCRF2 to classroom groups of students. Homeroom teachers were present during the administration. As a
measure of reading comprehension and general reading ability, it measures a student’s essential contextual reading abilities including word identification, word meaning, word building, sentence structure, comprehension, and fluency. For the TOSCRF-2, students were presented with short passages comprised of rows of contextually related words, ordered by reading difficulty. All words in the assessment are printed in uppercase, without any spaces or punctuation between words (AYELLOWBIRDWITHBLUEWINGS). Students were asked to draw lines between the boundaries of as many recognizable words as possible within 3 minutes (A/YELLOW/BIRD/WITH/BLUE/WINGS). Passages became gradually more complex in their content, vocabulary, and grammar. To do well on the test, the student needed to understand the meaning of the text and the words that comprised the text.

The TOSCRF-2 (Hammill, et al., 2014) was selected for several reasons. First, the TOSCRF-2 is valid and has strong alternate form and test-retest reliability. Correlations with criterion tests across 11 studies averaged .73, representing a very large correlation. Second, a student’s ability to comprehend text should ideally extend beyond curricular materials to include all types of reading material, across content areas, for in-school and reading for enjoyment. Whereas weekly reading tests provided in-program data related to reading performance, the TOSCRF-2 provided a broader measure of vocabulary and general reading ability for this study. Third, as a 3-minute measure, the assessment was time efficient.

**Data Collection during the Intervention.** During the study, curriculum-based reading tests were administered according to the protocol outlined in the reading series,
that is, in a large group format where students independently answered multiple choice questions and responded to a written prompt. Classroom teachers administered weekly tests in all classrooms. Since the assessments were designed to measure reading skills, no other support, beyond reading directions, was provided to general education students. As a data source, only the questions on the weekly assessment related to reading comprehension and vocabulary were collected and analyzed. Student scores on both of these sections were used in the data analysis.

**Posttest Data Collection.** Three forms of posttest data were analyzed at the end of the three-week intervention period. First, students in both the treatment and control conditions were asked to write meaningful novel sentences for the 30 words introduced in the reading selections for the lessons most recently completed. Teachers were provided with a script for the sentence writing task which appears in Appendix C. Sentence quality was evaluated based on the researcher created rubric criteria described earlier. Sentence writing data from control and intervention classrooms were compared to determine the impact of the intervention on student performance. It was anticipated that students in experimental classrooms who received more opportunities to hear and interact with targeted vocabulary in interactive and responsive contexts, would outperform students in control classrooms. So, student rubric scores from control classrooms reflected growth in word knowledge because of instructional routines specified in the reading program. Student rubric scores from intervention classrooms, however, reflected the combined impact of the instructional routines in the reading program plus the intervention. Student
work on the sentence writing task was scored by members of the scoring team noted earlier.

Additionally, scores on the comprehension and vocabulary measures included in weekly tests administered during the intervention period were analyzed. As noted earlier, teachers use scores on weekly reading tests to evaluate how well students understood concepts addressed in the lesson.

The last bit of posttest data included interviews with the two intervention teachers. These informal conversations gave teachers the opportunity to reflect on the intervention and to share their observations about student learning. Teachers were asked (1) How did you feel about implementing the Word Learning Protocol? (2) How does the Protocol differ from current practice or typical teaching routines? (3) Based on observations of your students, how did your students respond to instruction designed around the Protocol? Ideas gleaned from these conversations are summarized in Chapter 4.

During the project, teachers had multiple opportunities to pose questions or concerns related to the study. Specifically, I visited the school building on Day 1 of instruction when vocabulary words were introduced and the intervention was initially implemented. I was also on site an additional one or two days per week during the intervention period to answer questions about the project or to address questions about the word learning protocol or sentence creation task used in the intervention classrooms. Finally, teachers emailed or forwarded questions via text messaging when they needed quick points of clarification on project details. These face-to-face opportunities and
email or texting exchanges provided an arena for communication and collaboration throughout the study.

**Data Analysis.** Two statistical tests, namely an analysis of variance (ANOVA) and an analysis of covariance (ANCOVA), were selected to analyze data collected for this 3-week study. First, I conducted an ANOVA test for evaluating data from the TOSCRF-2. The ANOVA allowed me to determine whether the classrooms differed on general reading ability. When completing the analysis, it would have been important to know that, although classes were intended to be heterogeneously grouped, one class could have been higher performing while another could have been lower performing. If this were the case, it would have to have been addressed when data were analyzed. Results of the ANOVA for the TOSCRF-2 are reported in detail in Chapter 4.

Next, an ANCOVA was used to compare pretest and posttest performance on the sentence writing task. Recall that one of the pretest measures included student scores from two weekly tests administered prior to the intervention. When these data were compared, I discovered that on one of the vocabulary measures, the classes were significantly different; for the second vocabulary assessment and for the first comprehension test, classes were close to being significantly different. Because the ANCOVA allowed initial differences between groups to be equalized, it was selected for analyzing performance on the sentence writing task. The sentence writing task data, however, were analyzed in two different ways. As noted earlier, only sentences which reflected a word’s meaning specified in the weekly reading selection received credit. In the first analysis, pretest and posttest sentences were graded as follows: if the word was
used correctly, points were awarded. If the word was used incorrectly, no points were awarded. The second analysis focused specifically on polysemous words. The pretest and posttest sentences were graded as follows: if a polysemous word was used incorrectly in the pretest, no points were awarded. That same word, then, was eliminated from the posttest and the student was not able to accumulate points even if the posttest sentence suggested that the student understood or had learned the meaning of the word. Through this analysis, it was possible to determine if the instructional intervention affected the polysemous words differently than the other words in the study which had only a single meaning. Each of these analyses is explained in detail in Chapter 4.

An ANOVA was also used to compare comprehension and vocabulary scores from weekly reading tests. Scores from these assessments for students in intervention and control classroom were compared. Results are reported in Chapter 4.
CHAPTER 4: RESULTS

The purpose of this study was to examine how a particular vocabulary intervention supported and promoted students’ word learning of vocabulary included in a district’s adopted reading series. Specifically, the intervention incorporated discussion and sentence writing as vehicles to strengthen the connections students made between spontaneous and scientific concepts. The intervention was implemented as words were introduced to students on the first day of an instructional sequence for reading lessons. The investigation was guided by the following research question: Does an intervention designed to increase word knowledge by using discussion and writing as ways to help students make connections between lived experiences and selected vocabulary improve students’ learning of that vocabulary?

Students in the fourth grade during the 2016-17 school year from a district in northeastern Pennsylvania participated in the study. Although 121 students were enrolled in the grade, just 105 students returned Consent and Assent forms. Of the participating students, 49 or 47% were male and 56 or 53% were female. The average age of students was 10 years 2 months.

On the following pages, study results are organized into two sections: Test Data and Teacher Interview Data. The Test Data section describes pretest and posttest measures I considered to address the research question. Teacher Interview Data includes an analysis of reflections from teachers who adjusted teaching routines to incorporate discussion and sentence writing into vocabulary instruction during the intervention period.
**Test Data**

Several types of data were collected during this investigation to determine whether the vocabulary intervention designed for the study had a statistically significant effect on the degree to which students in control and intervention classrooms were able to make connections between spontaneous and scientific concepts. At the beginning of the study, some classroom groups of students, even though assigned to homerooms based on multiple data sources to ensure heterogeneity, could have had more robust word knowledge than other groups. This would need to be accounted for in the analysis of the data. Administering several pretest measures, therefore, helped to generate classroom profiles that would allow for an accurate comparison of student performance between the experimental and control groups. These pretest measures included the TOSCRF-2, student scores from comprehension and vocabulary sections of weekly tests administered prior to the intervention period, and a sentence writing task. The TOSCRF-2, as one measure of reading comprehension and general reading ability, quantifies a student’s essential contextual reading abilities including word identification, word meaning, word building, sentence structure, comprehension, and fluency. This assessment provided a broad, independent measure of reading performance. Next, student scores from two weekly reading tests given before the intervention was implemented were gathered and analyzed. These test data provided a snapshot of student learning as a result of typical reading instruction delivered in fourth grade classrooms. Weekly reading tests evaluated an array of skills, including comprehension, vocabulary, grammar, and writing. However, only the scores for reading comprehension and vocabulary were analyzed in this study.
since the focus of the investigation was on examining how a vocabulary intervention helped students make connections between spontaneous and scientific concepts. Finally, in Chapter 3, I argued that writing is an action or behavior that can powerfully demonstrate what it means to know a word at a deep level (Flinspach, Scott, & Vevea, 2010). Therefore, a sentence writing task was also included as a pretest measure. Through writing, students were able to demonstrate whether or not they had a sound understanding of word meanings and whether they were able to use words accurately in sentences prior to any formal instruction.

At the end of the approximate three week study, data from two posttest measures were examined to gauge the effect of the intervention. These measures included test scores from weekly reading tests and the sentence writing task. Student scores on tests for reading lessons taught during the study were included in the analysis. Again, as for the pretest, only scores from the reading comprehension and vocabulary portions of the weekly assessments were considered. The sentence writing task was administered a second time to establish whether or not students had stronger understandings of word meanings as a result of having studied words in weekly reading lessons.

The analyses of the pre- and posttest data sources as well as the rationale for each type of analysis are included in the following paragraphs.

**TOSCRF-2: Test of Silent Contextual Reading Fluency – Second Edition.** As noted in Chapter 3, the TOSCRF-2 yields the following three types of normative scores: age and grade equivalents, percentile ranks, and index scores. The index score, as a type of standard score with a mean of 100 and a standard deviation of 15, was used in this
study to compare treatment groups. An analysis of the descriptive statistics revealed that
the data were normally distributed. (Skewness = -.5; Kurtosis = .120). Because the data
were normally distributed I ran an ANOVA test to determine whether the classrooms and
the groups were significantly different on the TOSCRF-2. First, as noted in Table 4.1,
there was no statistical difference among classrooms on index scores. Specifically, $F_{4,101} = 1.077, p = .372$.

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
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<td>4</td>
<td>267.962</td>
<td>1.077</td>
<td>.372</td>
<td>.041</td>
</tr>
<tr>
<td>Error</td>
<td>25133.928</td>
<td>101</td>
<td>248.851</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>897452.000</td>
<td>106</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>26205.774</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additionally, the means of index scores by control and intervention groups were
compared. These means and standard deviations are reported in Table 4.2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>89.36</td>
<td>16.343</td>
<td>61</td>
</tr>
<tr>
<td>Intervention</td>
<td>92.42</td>
<td>15.028</td>
<td>45</td>
</tr>
<tr>
<td>Total</td>
<td>90.66</td>
<td>15.798</td>
<td>106</td>
</tr>
</tbody>
</table>

Further, an ANOVA was used to determine whether the intervention classrooms were
statistically different from the control classrooms with regard to the index scores. Here,
again, the dependent variable was the index score on the TOSCRF-2. This analysis, as
noted in Table 4.3, indicated that there was no statistical difference between control and intervention classrooms on index scores. Specifically, $F_{1,104} = .972$, $p = .326$.

**Table 4.3**

*Dependent Variable: Index Score*

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>242.730</td>
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<td>242.730</td>
<td>.972</td>
<td>.326</td>
<td>.009</td>
</tr>
<tr>
<td>Error</td>
<td>25963.043</td>
<td>104</td>
<td>249.645</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>897452.000</td>
<td>106</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>26205.774</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Weekly Reading Test Data.** Test data from weekly reading tests were analyzed over the course of the study. The weekly reading tests from the Journeys reading series provide teachers with a measure of how well students understand the concepts addressed in weekly lessons. As noted earlier, weekly tests assess comprehension, vocabulary, grammar, and writing skills but only vocabulary and comprehension scores were considered for this study. As pretest measures, vocabulary and comprehension scores on two weekly tests administered prior to the intervention were analyzed. As posttest measures, vocabulary and comprehension scores on weekly tests administered during the intervention were analyzed. Results of these separate analyses follow.

**Weekly reading test data collected prior to the intervention.** I was interested in knowing whether student performance on vocabulary and comprehension assessments were comparable before the study began. To be clear, data from two weekly tests were included in this analysis. Classrooms were compared based on scores from two comprehension measures and two vocabulary measures. These data are referred to as
PreComp1, indicating the comprehension score on the first weekly test administered prior to the intervention and PreComp2, indicating the comprehension score on the second weekly test administered prior to the intervention. Similarly, PreVoc1 indicates the vocabulary score on the first pretest and PreVoc2 indicates the second vocabulary score. Comparing data across groups confirmed that there was variability in pretest data. Specifically, intervention and control groups differed on PreComp1 and PreVoc2. Data tables for these analyses appear in Appendix D.

Weekly reading test data collected during the intervention period. After each of the three reading lessons was taught, teachers administered weekly tests as directed in the Journeys reading series. These multiple choice assessments provided one indicator of the effect of instruction during the intervention period. Only scores on the comprehension and vocabulary sections of the weekly test were included in the analyses here to address the first two supplementary research questions noted in Chapter 3. Namely, first, was the intervention linked to gains in the weekly multiple choice tests which accompany the Journeys reading series for vocabulary? Secondly, was the intervention linked to gains in the weekly multiple choice tests which accompany the Journeys reading series for comprehension? Data in the analysis are referred to as PostComp1, indicating the comprehension score for Lesson 11; PostComp2, indicating the comprehension score for Lesson 12; PostComp3, indicating the comprehension score for Lesson 13. Similarly, for the vocabulary scores, PostVoc1 indicates performance on the vocabulary assessment from Lesson 11; PostVoc2 for Lesson 12; PostVoc3 for Lesson 13.
Table 4.4 shows means and standard deviations for comprehension and vocabulary scores for the control and intervention classrooms.

<table>
<thead>
<tr>
<th>Table 4.4</th>
<th>Means and Standard Deviations for Posttest Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>PostComp1</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>66</td>
</tr>
<tr>
<td>Intervention</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
</tr>
<tr>
<td>PostVoc1</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>70</td>
</tr>
<tr>
<td>Intervention</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
</tr>
<tr>
<td>PostComp2</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>66</td>
</tr>
<tr>
<td>Intervention</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>109</td>
</tr>
<tr>
<td>PostVoc2</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>70</td>
</tr>
<tr>
<td>Intervention</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
</tr>
<tr>
<td>PostComp3</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>67</td>
</tr>
<tr>
<td>Intervention</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>111</td>
</tr>
<tr>
<td>PostVoc3</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>70</td>
</tr>
<tr>
<td>Intervention</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
</tr>
</tbody>
</table>

An ANOVA compared performance on the comprehension and vocabulary scores for each of the reading lessons. Table 4.5 indicates that, based on weekly test data, there was a significant difference in student performance on PostVoc2 (Lesson 12), with the intervention classrooms having a higher mean. There was no difference for PostVoc between intervention and control classrooms for PostVoc1 (Lesson 11) and PostVoc3 (Lesson 13). Also, there was no difference between intervention and control classrooms for any of the comprehension measures.
Table 4.5

Summary Table for Weekly Posttests

<table>
<thead>
<tr>
<th></th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sum of Squares</td>
</tr>
<tr>
<td>PostComp1 Between Groups</td>
<td>1.643</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>PostVoc1 Between Groups</td>
<td>.059</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>PostComp2 Between Groups</td>
<td>.162</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>PostVoc2 Between Groups</td>
<td>2.008</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>PostComp3 Between Groups</td>
<td>1.421</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>PostVoc3 Between Groups</td>
<td>1.501</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

Sentence Writing Task. A sentence writing task using words listed for study from three weekly reading lessons was included as both a pretest and posttest measure. As noted in Chapter 3, each weekly reading selection included 10 words for a total of 30 words introduced and studied over the course of this investigation. Two sentence writing tasks were given, each made up of 30 sentences. The first sentence writing task was administered by classroom teachers as a pretest prior to the intervention period to
determine the degree to which students understood and were able to use the 30 vocabulary words in sentences, prior to instruction, which they would be studying in the next three lessons in the Journeys reading series. This same sentence writing task was administered by classroom teachers as a posttest after all three reading lessons were completed. As noted in Chapter 3, the script provided to teachers for each of the sentence writing tasks appears in the appendices of this document.

To verify the effect of the intervention and to determine how instruction affected students’ abilities to connect spontaneous with scientific concepts, an ANCOVA was used. This statistical test is selected when there may be multiple variables that could impact the dependent variable. Here, data were collected, prior to the intervention, for the comprehension and vocabulary sections of two weekly reading tests. So for this study, there were four variables that were considered as pretest data – two reading comprehension test scores and two vocabulary test scores. Performance on the sentence writing task was the dependent variable. The ANCOVA accounted for any variability in classroom performance on these comprehension and vocabulary measures. As noted above, at pretest, there was a significant difference in PreComp1 (p=.047) and in PreVoc2 (p=.002) warranting conducting an ANCOVA for the sentence writing task. All participating fourth grade students in this investigation were assessed on word knowledge once, prior to instruction and the implementation of the intervention, and a second time at the end of the intervention period, after words had been introduced and studied in all classrooms. It was necessary, however, to conduct two separate ANCOVA tests to determine the effect of the intervention on the different types of words represented in the
study. For the first analysis, all sentences written for each of the 30 words were evaluated and, as noted in Chapter 3, sentences were assessed using a 3-point rubric. Details for the first analysis are noted below. For the second analysis, careful consideration was given to words in the weekly reading selections which had multiple meanings. Examples of some of these polysemous words were vision, arrangement, and crushed. The second analysis was completed because students could write a sentence correctly using a polysemous word but not use it in a way that demonstrated knowledge of the target definition. Therefore, if a student wrote a sentence with an alternate meaning in the pretest, the word and sentence were eliminated from the posttest. So, instead of evaluating 30 sentences, the total number of sentences included in this second analysis was determined by how students used polysemous words in the pretest. A further explanation of how each analysis was conducted as well as results for each of the analyses follow. Note that these analyses were conducted to address the third supplementary question posed in Chapter 3: Was the intervention linked to gains in the sentence writing task at posttest?

**Sentence writing task including polysemous words.** For the first analysis, scores on the pretest and the posttest sentence writing task were compared using the words from all three reading selections. Each student wrote and was scored on 30 sentences. Students received credit on both the pretest and the posttest if sentences reflected the target definition specified in each of the weekly reading selections. As an example, for the word vision, the target definition for the weekly story was “a mental image of what something could be like.” Students received credit for sentences on either the pretest or the posttest if sentences reflected this target definition. So, if one student wrote, “My
vision is really good and the eye doctor says I don’t need glasses,” no credit was awarded since the meaning of vision did not match the target definition. If, however, this same student wrote the sample sentence on the pretest but then on the posttest wrote, “Last night I had a vision that our All Star Team won the Little League World Series,” he did receive points for the posttest response. In this example, the student received no credit on the pretest where the sentence reflected an alternate meaning for vision, but did receive credit on the posttest where the sentence reflected the target definition accurately. Table 4.6 shows the means of percent of correct scores for this first analysis for control and intervention classrooms. Data were analyzed using all student scores (Unadjusted Means) and with outliers in the data removed (Adjusted Means).

<table>
<thead>
<tr>
<th>Table 4.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Means</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Intervention</td>
</tr>
</tbody>
</table>

To determine if the differences in performance on the sentence writing task between control classrooms and intervention classrooms at posttest were significant, a repeated measures ANCOVA was used. As reported in Table 4.7, below, there is a statistically significant interaction with a medium to large effect size. This suggests that the difference between the pretest and the posttest was not the same for the control and the intervention groups. To be clear the Between Subjects data indicates that there was no statistically significant difference between the control and intervention groups (p=.346) on the sentence writing tasks. However, Pre-Post*Group (p=.000) indicates that one
group improved at a statistically significant faster rate than the other. The slopes compared below in Figure 4.1: Interaction Including All Words confirm that the intervention group improved at a faster rate.

| Table 4.7 |
| Repeated Measures ANCOVA Summary Table |

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covariate</td>
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<td>.135</td>
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<td>.029</td>
</tr>
<tr>
<td>Group</td>
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<td>.042</td>
<td>.897</td>
<td>.346</td>
<td>.009</td>
</tr>
<tr>
<td>Error</td>
<td>4.492</td>
<td>97</td>
<td>.046</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Post</td>
<td>.030</td>
<td>1</td>
<td>.030</td>
<td>4.310</td>
<td>.004</td>
<td>.043</td>
</tr>
<tr>
<td>Pre-Post * Covariate</td>
<td>.029</td>
<td>1</td>
<td>.029</td>
<td>4.260</td>
<td>.041</td>
<td>.042</td>
</tr>
<tr>
<td>Pre-Post * Group</td>
<td>.091</td>
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<td>.091</td>
<td>13.220</td>
<td>.000</td>
<td>.120</td>
</tr>
<tr>
<td>Error</td>
<td>.670</td>
<td>97</td>
<td>.007</td>
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</tbody>
</table>

Since the ANCOVA for comparing performance between control and intervention classrooms suggested a statistically significant interaction with a medium to large effect size, a simple effects analysis was conducted as a follow-up to the significant interaction.
Table 4.8 confirms that there was no difference between groups at pretest (p = .970). However, when groups were compared at posttest, the differences were significant (p = .001). Additionally, the Pre-Post analyses for both the control and intervention groups suggest that both groups’ performance improved on the sentence writing task over the course of the intervention but the effect size for the intervention group was larger.

<table>
<thead>
<tr>
<th>Comparison</th>
<th>F</th>
<th>Significance</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group at Pretest</td>
<td>.001</td>
<td>.970</td>
<td>.000</td>
</tr>
<tr>
<td>Group at Posttest</td>
<td>10.941</td>
<td>.001</td>
<td>.091</td>
</tr>
<tr>
<td>Pre-Post for Control</td>
<td>97.482</td>
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<td>.600</td>
</tr>
<tr>
<td>Pre-Post for Intervention</td>
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<td>.000</td>
<td>.892</td>
</tr>
</tbody>
</table>

Figure 4.1 graphically demonstrates the relationship between the control and intervention groups’ scores on the sentence writing task which included all words. The chart suggests several things. First, performance for both the control and intervention classrooms on the writing task at the beginning of the study was similar. Next, both groups showed significant improvement over the course of the study as is evidenced by the slope of the lines. The quality of both groups’ sentences improved after instruction, regardless of the type of instruction they received. However, both Table 4.7 and Figure 4.1 indicate that the intervention group significantly outperformed the control group on the sentence writing task which included all 30 words relative to the rate at which they learned words.
credit again was only awarded if sentences reflected the target definition for each of the weekly words. For example, one of the weekly words was *crushing* meaning “smashing.” So, “Last week, I couldn’t wait until my basketball game and in five minutes into the game, the other team was *crushing* us,” received no credit; whereas, “A heavy rock fell on my plastic pencil and I watched it as it was *crushing* it,” did receive credit. However, for this second analysis, how students used the word with the target definition in the pretest determined whether or not sentences were included in the analysis. On the pretest, if the sentence did not reflect the target definition for the word no credit was awarded and the word was removed from the analysis for both the pretest and the posttest. To clarify,
on the pretest, if the student wrote, “Last week, I couldn’t wait until my basketball game and in five minutes into the game, the other team was crushing us,” reflecting an alternate meaning for crushing, the sentence was eliminated from the pretest and the student’s pretest only included 29 items rather than 30 items – one sentence for each of the 30 words used in the study. In this same example, then, the sentence for crushing was also removed from the posttest regardless of whether or not the word was used correctly in the posttest sentence, leaving, again, 29 items on the posttest. In this way, the effect of the intervention on polysemous words could be calculated. Table 4.9 shows the means of scores for this second analysis for control and intervention classrooms.

<table>
<thead>
<tr>
<th>Table 4.9</th>
<th>Table of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted Means</td>
</tr>
<tr>
<td></td>
<td>Pretest</td>
</tr>
<tr>
<td>Control</td>
<td>57</td>
</tr>
<tr>
<td>Intervention</td>
<td>41</td>
</tr>
</tbody>
</table>

To determine if the differences in performance between control classrooms and intervention classrooms were significant when the polysemous words were eliminated, a repeated measures ACNOVA was used. These results are presented in Table 4.10. To be clear, the Between Subjects data indicate that there was not a statistically significant difference between the control and intervention groups (p=.394) on the sentence writing tasks. However, Pre-Post*Group (p=.000) indicates that one group improved at a statistically significant faster rate than the other. The slopes compared below in Figure 4.2: Interaction Excluding Polysemous Words confirm that the intervention group improved at a faster rate.
Table 4.10

Repeated Measures ANCOVA Summary Table

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covariate</td>
<td>.143</td>
<td>1</td>
<td>.143</td>
<td>2.787</td>
<td>.081</td>
<td>.028</td>
</tr>
<tr>
<td>Group</td>
<td>.037</td>
<td>1</td>
<td>.037</td>
<td>.732</td>
<td>.394</td>
<td>.007</td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Post</td>
<td>.024</td>
<td>1</td>
<td>.024</td>
<td>3.311</td>
<td>.006</td>
<td>.041</td>
</tr>
<tr>
<td>Pre-Post * Covariate</td>
<td>.031</td>
<td>1</td>
<td>.031</td>
<td>4.211</td>
<td>.043</td>
<td>.042</td>
</tr>
<tr>
<td>Pre-Post * Group</td>
<td>.108</td>
<td>1</td>
<td>.108</td>
<td>14.768</td>
<td>.000</td>
<td>.132</td>
</tr>
<tr>
<td>Error</td>
<td>.711</td>
<td>97</td>
<td>.007</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 4.10, there is again a significant interaction with a medium to large effect size. A simple effects analysis was conducted as a follow-up to the significant interaction. These results are presented in Table 4.11. This second analysis which excluded polysemous words confirms that there was no difference between groups at pretest (p = .877). However, when groups were compared at posttest, the differences were significant (p = .001). Additionally, the Pre-Post analyses for both the control and intervention groups suggest that both groups’ performance improved on the sentence writing task over the course of the intervention but the effect size for the intervention group was larger.

Table 4.11

Simple Effects Analysis for the Interaction Excluding Polysemous Words

<table>
<thead>
<tr>
<th>Comparison</th>
<th>F</th>
<th>Significance</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group at Pretest</td>
<td>.024</td>
<td>.877</td>
<td>.000</td>
</tr>
<tr>
<td>Group at Posttest</td>
<td>11.320</td>
<td>.001</td>
<td>.094</td>
</tr>
<tr>
<td>Pre-Post for Control</td>
<td>79.789</td>
<td>.000</td>
<td>.551</td>
</tr>
<tr>
<td>Pre-Post for Intervention</td>
<td>320.912</td>
<td>.000</td>
<td>.879</td>
</tr>
</tbody>
</table>
Figure 4.2 graphically demonstrates the relationship between the control and intervention groups’ scores on the sentence writing task when polysemous words were eliminated from the analysis of pretest and posttest sentences. This graphic representation is similar to Figure 4.1, the analysis which included all studied words. On the writing task, students in both the control and intervention classrooms performed similarly at the beginning of the study. Both groups showed significant improvement over the course of the three-week study. The quality of both groups’ sentences improved after instruction, regardless of the type of instruction they received. Similar to results from the first analysis which included all 30 studied words, in this second analysis which excluded polysemous words, although both groups improved, both Table 4.10 and Figure 4.2 indicate that the intervention group significantly outperformed the control group at the rate at which they learned words.

Figure 4.2: Interaction Excluding Polysemous Words
In sum, this research effort sought to address the following research question: Does an intervention designed to increase word knowledge by using discussion and writing as ways to help students make connections between lived experiences and selected vocabulary improve students’ learning of that vocabulary? Data and analyses here confirm that when discussion and sentence writing are incorporated into vocabulary instruction, students may be better able to strengthen connections between spontaneous and scientific concepts. To address how well students learned words over the course of the intervention, three data sources were evaluated, namely, the vocabulary and comprehension sections of weekly reading tests and a sentence writing task. As noted in Chapter 3, three questions helped to guide the analyses described here. First, was the intervention linked to gains in the weekly multiple choice tests which accompany the Journeys reading series for vocabulary? On the vocabulary assessments from the series, there were significant differences in student performance on just one of the weekly tests, namely for Lesson 12. See Table 4.5. Secondly, was the intervention linked to gains in the weekly multiple choice tests which accompany the Journeys reading series for comprehension? Analyses of comprehension scores from series showed that there were no significant differences between control and intervention groups. See Table 4.5. Finally, was the intervention linked to gains in the sentence writing task at posttest? Analyses of data from the sentence writing task indicated that there were significant differences in student performance, with students in the intervention classrooms outperforming students in the control classrooms. See Tables 4.7 and 4.10 and Figures 4.1 and 4.2.
Finally, although the analysis of data from the sentence writing task demonstrates that the intervention had a significant positive effect on student word learning, it is also important to note that the mean for students in the intervention class was 60.9% as noted in Table 4.6. Again, while there was a statistically significant difference in performance between students in control and intervention classrooms on this measure, this score suggests that there is still a substantial opportunity for growth as measured by the sentence writing task.

**Teacher Interview Data**

Over the course of the study, teachers were asked to respond to the following three questions about the word learning protocol which was designed specifically for use in the intervention classrooms as teachers introduced words to students: How did you feel about implementing the word learning protocol? How does the protocol differ from current practice or typical teaching routines? Based on your observations of your students, how did your students respond to instruction designed around the protocol?

The word learning protocol, as described in Chapter 3, provided students with multiple opportunities to interact with words from the weekly reading selection. During the first week of the intervention, the researcher modeled using the word learning protocol for the 10 target words while teachers observed. During the second and third weeks, the intervention teachers were provided with a word learning protocol for each of the remaining 20 words and the teachers used the protocols to introduce vocabulary to students. As noted earlier, a sample word learning protocol is included in Appendix A.
An analysis of the teacher responses to the interview questions revealed two big ideas – one potential strength and one potential weakness. First, as a strength, both teachers in intervention classrooms valued the word learning protocol as a tool to support word learning for students. Next, as a weakness, both teachers noted that the protocol, although a potentially worthwhile tool, would require additional planning time if they were faced with developing protocols on their own. This would place more demands on their daily schedules.

**Protocol as a Valuable Word Learning Tool.** Using information gleaned from my review of the literature, the word learning protocol developed for this study was designed to marry several strategies found to promote word learning. Essentially, the protocol focused on providing student friendly definitions for words, on providing students with multiple exposures to words in different contexts, on ensuring that students had opportunities to reinforce the phonological representations of words they were learning and on documenting thinking via sentence writing. Adams (1990) has suggested that new words are best explained using words students already know. Labeled as student friendly definitions, the definitions or explanations provided within the word learning protocol supported student thinking as they began to make connections between what was familiar, i.e., background knowledge (spontaneous concepts), and the words they were learning (scientific concepts). The quality of the student friendly definitions, therefore, affected how well students were able to understand the new words. Next, the protocol provided students with extended and varied opportunities to interact with words. As noted earlier, ensuring that students heard and used words multiple times was essential in
promoting word learning. Next, students repeated words, after an adult model, at least 5 times in each protocol to ensure that they practiced and created the correct phonological representation of words they were learning. Both teachers commented that students often mispronounce novel words, particularly longer words. Rather than asking students to read a new vocabulary word, as occurred in Journeys lessons during classroom observations, the protocol ensured that words were pronounced correctly the first time. For example, as noted in Observational Data above, in one classroom, two students mispronounced _debut_ before a third student pronounced it correctly after which the teacher reinforced the correct pronunciation. Finally, after defining the word, hearing the word used in different ways, and discussing scenarios with peers, students wrote a “SUPER SENTENCE” in word journals. Writing, as the highest form of comprehension, allowed students to document thinking as a permanent produce of their learning.

Both intervention teachers cited reasons for the protocol being a valuable tool for encouraging word learning. Both commented that they had not used a document organized like the protocol prior to the intervention. One teacher noted that the vignettes included in the protocol were “well written” and “included topics relevant to fourth graders.” One teacher indicated that since the protocols were structured identically, the word learning routine was “easy to learn and use” both for the teacher and the students. Both teachers indicated that the predictability of the activities helped to establish clear expectations for students. Students learned that after the student friendly definition was provided they would be asked to ‘Say more about the word’ meaning that they would complete an oral CLOZE activity. The teacher read a vignette, paused, and gestured to
students to indicate that they should say the target word as it fit in the vignette.
Completing all of the activities also became more efficient after each protocol and
teachers found that just 2 to 4 minutes was an adequate amount of time to devote to each
word learning sequence.

Both teachers also indicated that the instructional routine outlined in the protocol
did differ from the routine specified in the Journeys reading series for introducing
vocabulary. However, they felt that this departure from the series was not detrimental to
overall word learning nor did it take up extended periods of instructional time during the
regularly scheduled Language Arts block. Rather, the protocol provided students with
several different examples of a word’s use rather than just the single example provided on
a Vocabulary in Context Card or in the 2-page reading selection used for introducing
words. When using the 2-page story, teachers paused and questioned students as to
possible word meanings based on word use in the story. Again, students used information
from the story as they arrived on a plausible word meaning. This routine, however, did
not provide them with the array of word meanings used in the word learning protocol.

Last, as an additional benefit to students, teachers commented on how writing was
incorporated into the intervention as the last step in the word learning protocol. Both
teachers noted that writing was challenging for most students. One of the activities
embedded in the word learning protocol called ‘Ask Questions’ directed students to talk
over ideas with a partner. This activity allowed students to share ideas about familiar
topics. For example, for the word *stranded*, three questions were posed. First, “What
would it be like to be *stranded* in your house during a snowstorm? Tell your partner.”
Next, “What could you do for fun if you were stranded in an airport? Share some ideas with a partner.” Last, “Would a polar bear be stranded on an iceberg? Yes or no. Explain.” Teachers felt that the partner talk or sharing with peers benefitted students, particularly students reluctant to share ideas with a large group or students who were English language learners. As they engaged in conversations with peers to talk about the vocabulary words in ‘Ask Questions,’ students began to generate ideas that they could use in sentences they were asked to write as the final activity in the protocol, namely to write a SUPER SENTENCE for the word in the Vocabulary Journal. Teachers agreed that talking about ideas before writing helped student to produce better sentences. In fact, this was confirmed by analysis of the sentence writing task data collected during the study.

**Time Challenges.** Although both teachers found that the word learning protocols created for the intervention to be efficient for introducing vocabulary words to students, both also indicated that creating a protocol for every word taught would be time consuming, beyond what they could manage. In addition to time constraints, after working with the protocol for three reading selections, teachers both agreed that creating an individual protocol could be challenging. To do so would require coming up with scenarios that would generate the desired conversations around words and selecting topics which would initiate meaningful conversations for their fourth grade students. However, if given the time necessary to develop the protocols, they could be used from one year to the next as long as the reading series remained the same.
In sum, teacher reflections on the word learning protocol were overwhelmingly positive. The protocols provided an arena for student to share ideas and primed the pump for recording ideas via sentence writing as a permanent record of word learning. Although the challenge of having the time to create protocols for all words studied during the school year remains, it is hoped that the outcome of the study reinforces for teachers the potential that discussion and writing have for student word learning.
CHAPTER 5: IMPLICATIONS

I conducted this research study to determine the effects of a particular vocabulary intervention on 4th grade students’ word knowledge. More specifically, I was interested in seeing if discussion and sentence writing would buttress connections between spontaneous and scientific concepts for students as these concepts developed in reading classes.

A singular research question guided my study: Does an intervention designed to increase word knowledge by using discussion and writing as ways to help students make connections between lived experiences and selected vocabulary improve students’ learning of that vocabulary? Guided by Vygotsky’s (1987) thinking on understanding how children’s concepts develop, this study was designed to provide children with opportunities to expand word knowledge. In the intervention classrooms, teachers were given word learning protocols for introducing each of the words in reading lessons which were taught during the three-week study. As noted in Chapter 3, these word learning protocols were designed to provide multiple opportunities for children to interact with and explore meanings of words they would encounter in upcoming reading selections. A sample protocol is included in Appendix A. Per the protocol, children were encouraged to engage in guided discussions with words so that they could uncover and solidify what they already knew about words that they would be encountering in grade level reading selections. These guided discussions allowed students to begin to connect their current understandings about words (spontaneous concepts) to new information they would be learning about words (scientific concepts). As part of the intervention, after discussing
words, children wrote sentences in word journals to represent a permanent product of their thinking at the point when words were introduced. In the control classrooms, instruction occurred as outlined in the district-adopted reading series. Teachers were directed to deliver vocabulary instruction in a ‘business as usual’ fashion in these classrooms.

I hypothesized that discussion and sentence writing which occurred in the intervention classrooms would give students extended opportunities to hear and use words. It was through discussion and sentence writing that they would begin to link spontaneous to scientific concepts. The expected outcome was that word learning would improve. I anticipated that students assigned to the treatment condition would score higher on measures of vocabulary collected for the study than students in the control group. Study outcomes described in Chapter 4 confirmed that students in intervention classrooms outperformed students in control classrooms on assessments used in the study.

**Implications for Research**

Multiple data sources were analyzed to help determine the effect of the intervention on student word learning and to test the accuracy of my hypothesis. Pretest data included scores from the comprehension and vocabulary sections of weekly tests administered prior to the intervention period as well as an assessment of overall reading ability. These measures allowed me to determine whether control and intervention classrooms were statistically compatible. In addition, students were asked to write sentences for the 30 words they would be learning during the 3-week intervention period.
This sentence writing task was included to help gauge students’ word knowledge prior to instruction. Two posttest measures helped to evaluate the effect of the intervention. First, scores on comprehension and vocabulary sections of weekly test administered during the intervention period were compared for control and intervention groups. Additionally, the sentence writing task was administered a second time to see if student understanding of words improved, as measured by the writing task, as a result of the intervention.

**Thoughts on What Occurred.** I approached this study with a strong desire to connect what research suggests supports students’ word learning to an instructional model or intervention that would be manageable for teachers to implement in classrooms. Blachowicz, Bates, and Cieply (2015) indicate that there is a need for research on vocabulary in authentic school contexts. Further, practical methods for teaching vocabulary in schools are typically underdeveloped (Wanzek, 2014; Lee, Roberts, & Coffey, 2016; Loftus & Coyne, 2013). This study represents one such attempt for making practical what the literature advocates for improving students’ vocabularies. Although there are imperfections in most research studies, there are things that worked well here and there are things I might adjust as a result of what I learned while conducting the study. Each of these ideas will be addressed in turn.

First, prior to the intervention, I was interested in knowing whether any of the 4th grade classrooms was higher performing than any of the others. At the beginning of each school year, students are assigned so that classrooms have a heterogeneous mix of students. However, given variability on how students perform on assessment measures, the guiding metric for classroom assignment, it was uncertain as to whether this was the
case. Therefore, pretest data, described earlier, were collected and analyzed to ensure that classrooms were statistically equivalent. It was important that classrooms were comparable to be able to get an accurate picture of the effect of the intervention. The careful analysis of the pretest data allowed me to eliminate any variability in classroom performance evident at the beginning of the study which might affect the study outcomes.

Next, I felt that the sentence writing task was a valuable tool for evaluating students’ word knowledge. Although not a standardized assessment in itself, sentence writing did provide information that suggested how well students understood a word’s meaning. The task also showed whether students were able to use the word appropriately according to the rules of English grammar. For example, for *weariness*, one student wrote, “I had *weariness* when I didn’t go to bed early.” The use of *weariness* in this sentence suggests that the student had at least an emerging understanding of the word’s meaning, i.e., that *weariness* has something to do with being tired, as evidenced by the reference to going to bed early. However, its use in this sentence was not grammatically correct. As noted by Lesaux, Kieffer, Faller, and Kelley (2010), writing sentences using new vocabulary words supports students as they begin to experiment with and internalize new words in an attempt to add the words to their lexicons. Additionally, Flinspach, Scott, and Vevea (2010) contend that writing is an action or behavior which allows children to demonstrate what it means to know a word. The sentence creation task, then, was one way of allowing children to expressively demonstrate their understanding of word meanings.
In addition to making sure classrooms were comparable and using an expressive measure as one gauge of word knowledge, all of the sentences that students produced were evaluated by a scoring team using a rubric designed for the study. This, too, was a positive feature of the study. As noted in Chapter 3, the scoring team attempted to limit subjectivity by collaboratively scoring student work until consensus was achieved. During this calibration process, sentences which matched each of the rubric criteria were organized according to number of rubric points awarded. Because there were multiple scoring sessions, it was important to document how sentences were scored so that scoring remained consistent from one session to the next. The scoring team discussed criteria for sentences that missed the mark completely, those that were ‘almost right,’ and those that indicated that students had a clear understanding of a word’s meaning. These criteria and conversations about students’ sentences were invaluable as scorers awarded rubric points for student work. Table 5.1 provides anchors used during scoring sessions for number of points awarded for each sentence, target words, and sample sentences.

<table>
<thead>
<tr>
<th>Points</th>
<th>Target Word</th>
<th>Sample Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>concluded</td>
<td>I was not <em>concluded</em> in activities at school.</td>
</tr>
<tr>
<td>½</td>
<td>weariness</td>
<td>I was <em>weariness</em> when I was sick.</td>
</tr>
<tr>
<td>1</td>
<td>stranded</td>
<td>I was <em>stranded</em> when a tornado hit because it threw my house real far.</td>
</tr>
<tr>
<td>1 ½</td>
<td>alert</td>
<td>The sign has the word <em>alert</em> on front of it because there was going to be a tornado.</td>
</tr>
<tr>
<td>2</td>
<td>huddle</td>
<td>When I was watching the football game, the coach called, “Time out!” then some players gathered into a <em>huddle</em>.</td>
</tr>
</tbody>
</table>
**Thoughts on What Comes Next.** Although ensuring classrooms were comparable prior to the study and using a sentence writing task to measure student word knowledge were strong features of this study, there are a couple of study elements that might benefit from extended time, attention, and reflection. One idea worth considering for future studies would be including a measure of students’ long term retention of word meanings taught since the size of students’ vocabularies plays an important role in their lives and future possibilities. A large and rich vocabulary is strongly related to reading proficiency (Beck & McKeown, 2007). Since it is difficult to accurately measure the size of one’s vocabulary, teachers may need to discuss options for how best to know whether students’ vocabularies are increasing. Certainly, an assigned sentence writing task, like the one used in this study, administered several weeks after words were taught would provide at least one measure as to how well students were retaining targeted word meanings. As a note for this study, no opportunity was available for evaluating long term retention of word meanings since the intervention occurred in the spring of the school year. Another option would be to monitor student writing assignments with a focus on how well or frequently students incorporated words used by mature word and language users. In Chapter 1, I argued that ‘owning a word’ allows writers to use words flexibly to express their thoughts. Although a writing activity or assignment might take different forms, including unusual words makes writing clearer and more precise and drawing student attention to word usage in their writing is one way to promote word ownership.

A second adjustment I might make to this study would be to teach a sample lesson prior to beginning the formal study. I found that some of the planned activities for
Introducing words took longer than expected and that, based on student responses, the expectations and directions for activities may not have been clearly articulated. This would mean creating an additional set of resource materials and planning for additional time in classrooms at the research site. Although I was able to make the necessary adjustments to lessons for teachers so that each lesson fit within the specified time block, I suspect that lessons may have gone more smoothly had a trial run for introducing weekly vocabulary words been incorporated into the early part of the study. This would have allowed the procedures to become somewhat routinized for students so that they could focus more directly on learning words rather than learning the expectations for a particular instructional sequence. Although the word learning protocols were formatted identically and students quickly became familiar with the word learning structure, the protocols did represent a ‘new’ way of exploring word meanings.

In sum, noted here are potential strengths of this study as well as areas for continued refinement. Ensuring that classroom profiles were similar, the use of the sentence writing task as a gauge of student word knowledge, and scoring student work consistently were important considerations as study results were interpreted. Future studies may do well to attend to assessing longitudinal effects of word study on student word knowledge. Additionally, teaching the word learning routines prior to studying how the routines impacted student word learning may have helped to use instructional time more efficiently.
Implications for Practice

The goal of this research effort was to consider how Vygotsky’s (1987) thinking about concept development might influence the ways teachers supported students as they introduced vocabulary for weekly lessons. Research on best practice for vocabulary instruction, highlighted in Chapter 2, and the study results discussed in Chapter 4 suggest that word learning routines specified in a reading series may benefit from enhancements which include discussion and sentence writing. In the following sections, I will discuss how this study might inform current practice for both teachers and those providing support for teachers around vocabulary development.

Implications for Teachers. There are clear take-aways from this study, supported by data, for teachers to consider when teaching vocabulary in classrooms. First, careful consideration should be given to how word knowledge is assessed since assessments typically found in school-based curricular materials often provide limited information as to how well students know words. As reported in Appendix D, prior to the intervention average scores on vocabulary measures were 92% for the first weekly test and 85% for the second weekly test. Moreover, although 10 words were taught for each selection, just 5 words were assessed in the weekly test and this sampling of word knowledge was intended to provide teachers with information as to how well students knew taught words. Since just half of the words were tested, it was questionable as to whether the weekly assessment was an accurate indicator of word knowledge. Finally, as selection tasks, multiple choice assessments indicate whether students can recognize and select word meanings from several options. However, Stahl (1999) notes that knowing a word
includes a full and flexible knowledge of a word as well as how the word’s meaning adapts to different contexts. This suggests that as teachers use weekly test data to gauge word learning, they should be mindful that a multiple choice assessment may provide an incomplete or, perhaps, an unreliable measure of students’ word knowledge. As evidenced in this study, students scored far lower on the sentence writing task than they did on the multiple choice tests. In sum, this study suggests that teachers should carefully consider how vocabulary knowledge is measured and reported if the goal of instruction is to have students “own” words.

Second, the study strongly suggests the importance of supplementing the word study exercises included in a reading series with work that helps students make clear connections between their lived experience and the words they are being taught. Students in intervention classrooms were introduced to weekly vocabulary words via a word learning protocol. As noted earlier, the protocol was designed to provide students with information about words, beginning with a student friendly definition for each word, and then with mini scenarios describing how each of the words applied to short vignettes. Per the protocol, students in intervention classrooms also engaged with words via teacher monitored discussions with peers using questions included in the protocol. For example, after the word, trembled, was defined and students worked through several vignettes with the target word, they discussed the following prompt with peers, “The little dog was afraid of most everything but was particularly fearful of larger dogs and often trembled when she saw a dog larger than she was. Show your partner what the little dog would do when she saw a Great Dane, one of the largest dog breeds.” My goal in designing each of
the discussion prompts was to provide students with scenarios that they could relate to personal experiences to, again, reinforce the connections between spontaneous and scientific concepts. In Chapter 2, I argued that when classroom instruction focused on word learning incorporates discussion based teaching methods, students’ word learning improves (Lawrence, Crosson, Pare-Blagoev, & Snow, 2015). More globally, discussion, in general, correlates with student academic outcomes (Applebee, Langer, Nystrand, & Gamoran, 2003; Gamoran & Nystrand, 1991; Nystrand & Gamoran, 1991; Nystrand, Wu, Gamoran, Zeiser, & Long, 2003). In addition, the intervention classrooms incorporated writing into word learning routines. Graham and Herbert (2010) noted that writing improves comprehension in language arts and also across other content areas. Lesaux, Kieffer, Faller, and Kelley (2010) also found that as students incorporated vocabulary words in writing tasks, word learning improved. Data included in Table 4.8, Figure 4.1, Table 4.10, and Figure 4.2 confirmed that students in intervention classrooms, where discussion and writing were incorporated in instructional routines for learning weekly vocabulary, outperformed students in control classrooms on the sentence writing task designed for the study which was one measure of word learning. Additionally, students in intervention classrooms outperformed students in control classrooms on one of the three posttest measures for vocabulary as noted in Table 4.5.

Finally, as noted in Chapter 4, students in the intervention classrooms learned words at a faster rate than students in control classrooms (Tables 4.8 and 4.10 and Figures 4.1 and 4.2) with the only difference in the classrooms being the use of the word learning protocol. The protocol developed for the study was intended to bridge the gap...
between what students already knew about words (spontaneous concepts) and what they would learn (scientific concepts) in each of the weekly lessons. Given that vocabulary knowledge is strongly related to comprehension, the ultimate goal of reading (Anderson & Freebody, 1981; Baumann, 2009; Rosenshine, 1980; Beck, McKeown, & Kucan, 2013), students who learn words more quickly, in this case, those students in intervention classrooms, may be at an advantage as they navigate grade level texts. It should be noted that using the protocol came at very little cost given that it took the same amount of instructional time as typical vocabulary teaching routines specified in the adopted reading series. Study results reported in Chapter 4 suggest that using a tool, like the word learning protocol which reflected what research suggests as best practice for word learning, may be a strong consideration when examining instructional practices and routines relative to word learning.

**Implications for Providing Staff Development.** This study also sought to explore ways for teachers to effectively implement research based practices to support word learning by helping students connect spontaneous and scientific concepts. Interview data shed light on considerations to guide future professional development efforts toward this end. As noted in Chapter 4, teachers shared that students were interested and engaged as they worked through each step of the word learning protocol used in this study. Teachers reported that the protocol was a departure from the instructional routine specified in the reading series but that incorporating the protocol into vocabulary instruction was a positive change and that it supported students in learning weekly words. In fact, data collected during the 3 week study confirmed that students in intervention
classrooms outperformed students in control classrooms on measures of word knowledge. However, from the teachers’ perspectives one challenge remained, that of sustainability.

For the 3 week study, I created all of the word learning protocols and provided them to teachers as resources for teaching weekly words. Ideally, teachers would need to take ownership of creating the protocols or a similar document so that discussion and sentence writing could be incorporated in vocabulary instruction since these features were an integral part of instruction in the intervention classrooms. Teachers felt, however, that creating word learning protocols for lessons would be beyond what they could comfortably manage during the school day. The primary concern was the amount of time they thought would be necessary to create protocols for the 10 words introduced in each weekly lesson. Although time constraints can pose a problem given the demands that teachers face, data collected during this study was convincing and did reveal that vocabulary knowledge improved when discussion and sentence writing were included in instructional routines. Beyond understanding that a structure like the word learning protocol was a solid first step in supporting word learning, teachers would need to explore ways to address the challenge of devoting time to this effort.

One option might be analyzing each component of the word learning protocol. With a clearer understanding of each element of the protocol and its potential contribution to student learning, teachers may be able to look for natural opportunities in the vocabulary teaching sequence where an enhancement could fit. One such opportunity was evident when words were introduced via student friendly definitions. During my initial classroom observations to get a sense of typical vocabulary instruction at this grade
level, I noted that the student friendly definitions included on the Vocabulary in Context Cards which teachers used from the reading series were not always helpful or clear for students. These definitions, however, could be used as the first step in helping students connect everyday concepts to words they were learning. As an example, *incident* was defined as “a single event or experience that is unusual or unpleasant” on the Vocabulary in Context Card. As described in classroom observation data in Chapter 4, teachers provided limited, if any, elucidation of word meanings, nor did they attempt to connect what students might have experienced around each of the words. In fact, in these observations teachers often asked students what they thought the word meant. In contrast, as I created student friendly definitions and vignettes, I considered experiences that would likely be familiar to most 4th grade students and included these elements as a first step to support word knowledge. *Incident* was defined as “something that happens.” Immediately after providing the definition, students were presented with a cohesive and familiar scenario. Chilton and Ehri (2015) documented the positive effects on word learning when students were presented with similar texts. For the same word, *incident*, I included the following: *It was an incident like no other. What might make Jonathan’s birthday party an event to remember? There was a cake – no surprise! There were candles – no surprise! But, one incident did manage to make this birthday special. It was the appearance of a magician. One trick after another... making dollar bills disappear, making rabbits pop out of hats! Jonathan would always be able to point to one special incident, when the magician arrived, that made his birthday magical.* Although this adjustment to instruction would necessarily take some advanced planning and / or mental
energy, the connections students began to make to everyday concepts when these refinements to introducing words was included was shown to contribute to developing word knowledge. Additionally, teachers might consider eliminating allowing students to guess at word meanings and substituting an activity like a vignette, which was more teacher directed, to support connections between lived experiences and novel word meanings.

A second element embedded in the vocabulary instruction in intervention classrooms was a focus on providing students with multiple opportunities to hear and say each of the vocabulary words. According to Hiebert and Kamil (2005), single or just a few exposures to words are unlikely to produce the desired learning. Although there is no optimal number of exposures which guarantees word learning, what the research does suggest is that multiple exposures are necessary. Providing students with several exposures to words within a brief period of time was incorporated into the word learning protocol but it is not imperative that this same structure be used. Rather, teachers would need to intentionally plan for engaging students with words. This may be a shift from typical instruction as was evidenced during classroom observations, but this intentionality would require little if any extra time.

A final possible option to address teacher concern around the time consuming nature of vocabulary instruction included in the intervention might be to devote time during Act 80 days for collaboration in grade-level teams to focus on refinements to vocabulary instruction to include discussion and sentence writing. Allowable by the State Department of Education, Act 80 days may be used for activities that support
instructional programming. Because there is district autonomy in determining an agenda for Act 80 days, it would likely be the responsibility of the building administrator to direct these efforts. Sharing the results of a study such as this would be a positive first step in heightening awareness of how incorporating research based practices can help to build students’ word knowledge with the ultimate goal of supporting reading comprehension.

In sum, I continue to work with administrators and teachers as they refine day-to-day instructional practices to meet the learning needs of their students. Often, despite years of educational experience, administrators and teachers encounter groups of students with unique learning needs that challenge the limits and resources of school systems. Guided by the current research, this study focused on just one aspect of reading instruction and was designed to test whether small changes in instruction could positively impact word learning by buttressing connections between spontaneous and scientific concepts. Data showed that word learning is amenable to these changes in instruction.
REFERENCES


Learner factors/teacher factors: Issues in literacy research instruction (pp. 185-192). The Fortieth Yearbook of the National Reading Conference, Chicago, IL.


Wanzek, J. (2014). Building word knowledge: Opportunities for direct vocabulary instruction in general education for students with reading difficulties. Reading & Writing Quarterly, 30, 139-164.


APPENDIX A

Word Learning Protocol: VISION


1. Say the word. Ask students to repeat the word. vision
2. Provide a student friendly definition. Your vision of a future situation is what you imagine or hope it would be like, if things were very different from the way they are now.
3. Vignette. (As you read the vignette aloud, pause, point to students and have students say the target word aloud.) Stephen always dreamed of becoming a doctor. His vision was to work in poor countries to help people there. To achieve his vision, he knew he would need to study hard and get good grades. When he passed his first tests with all A’s, he felt he was one step closer to his vision. For four years, he studied every chance he got. At last, it was time to graduate. “My vision has come true!” he said. Soon he would be traveling to poor countries to provide medical care to those in need.
4. Ask questions. Allow students to talk over ideas briefly with a partner.
   a. It was the day for Elizabeth’s party at the park. When she got up and looked out the window, she knew, right away, her vision for a great day was ruined. What do you think she saw when she looked outside?
   b. What is your vision of an awesome summertime activity? Tell your partner.
   c. Billy grabbed on his uniform and ran to the ballpark. Today was the big day and his team was up against the Phillies – the best team in the league! Billy had a vision for how the game would turn out. What do you think his vision was? Tell your partner.
5. Elicit word use. Write the word on the board. Read the sentence. When you pause for the (blank), point to the word and have students say the vocabulary word.
   a. Abraham Lincoln stated, “I am naturally anti-slavery.” Everyone being free was his ____________.
   b. Many people are concerned about the environment. Eliminating pollution is an important part of their ________.
   c. Joseph had always been a great basketball player. “I want to play in the NBA,” he told his coach. “That’s my _______!”
   d. The lunar landing module, Eagle, touched down on the moon. Neil Armstrong would soon be the first man to walk on the moon’s surface. It was all part of the United States’ ________.
6. Discussion Prompt. Tell your partner about your vision for the perfect birthday party. What would be included in your vision?
7. Write a SUPER SENTENCE for the word in the Vocabulary Journal.
APPENDIX B

SAMPLE SCHOOL East
Pretest Data Collection - Sentence Writing Task

May 2017

Please use the following script for the Sentence Writing Task:

For the next three reading lessons, we will be learning new vocabulary words just as we have been doing all year. However, you may already know some of the words in each of the stories we will be studying.

So, I would like you to write a sentence for each of the words before we study them. The quality of your sentence will let me know how well you know each word and whether we need to spend a lot of time or just a little time studying and working with the vocabulary for each of the stories.

For example, think of the word famished. It means ‘really hungry.’ You could write, “The dog was famished.” But that wouldn’t really tell me if you knew what famished means. You would need to write a better sentence like, “The dog was sick and hadn’t eaten for three days, so when Maggie gave him his food, he was so famished that he gobbled it all up!” That is a sentence that lets me know you really understand what famished means.

I will say one of the vocabulary words. I want you to repeat the word aloud. Then you will have 2-3 minutes to think and write a sentence for each word. If you do not know the word or if you are not sure what the word means, then just guess at what the word might mean and write your sentence. You must write something down for each of the words. As always, please do your best work.

Are you ready? Here is your first word…

<table>
<thead>
<tr>
<th>Lesson 11 The Screech Owl Who Liked Television</th>
<th>Lesson 12 The Earth Dragon Awakes</th>
<th>Lesson 13 Antarctic Journal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Arrangement</td>
<td>Constructed</td>
<td>vision</td>
</tr>
<tr>
<td>2 Disbelief</td>
<td>Crushing</td>
<td>standards</td>
</tr>
<tr>
<td>3 Enderead</td>
<td>Debris</td>
<td>huddle</td>
</tr>
<tr>
<td>4 Hastened</td>
<td>Possessions</td>
<td>alert</td>
</tr>
<tr>
<td>5 Pounced</td>
<td>Rubble</td>
<td>weariness</td>
</tr>
<tr>
<td>6 Presence</td>
<td>Slab</td>
<td>fractured</td>
</tr>
<tr>
<td>7 Tempted</td>
<td>Tenement</td>
<td>graceful</td>
</tr>
</tbody>
</table>
### Scoring the Sentence Writing Task:

Some words have multiple meanings. If the word used in the student’s sentence has a different meaning than the word meaning specified in the Journeys reading selection (i.e., *utter* – to say something or *utter* – complete and total) and the student response reflects the alternate meaning, the student will receive credit. Also, if the sentence uses the singular form of the word (i.e., possession / possessions) rather than the plural form provided in Journeys and the sentence suggests a student has a clear understanding of the word, the student will receive credit.

### Scoring Rules:

<table>
<thead>
<tr>
<th>Points</th>
<th>Explanation</th>
<th>Target Word</th>
<th>Sentence Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>The sentence provides no or very limited information about the meaning of the target vocabulary word.</td>
<td>famished</td>
<td>I am famished.</td>
</tr>
<tr>
<td>One</td>
<td>The word’s use in the sentence provides some, although limited information about the meaning of the target word.</td>
<td></td>
<td>I am famished every night before dinner.</td>
</tr>
<tr>
<td>Two</td>
<td>The sentence reflects a clear understanding of the target word.</td>
<td></td>
<td>I was famished since I had not eaten anything for two days.</td>
</tr>
</tbody>
</table>
Please use the following script for the Sentence Writing Task:

For the past three reading lessons, you have been learning new vocabulary words. Some of the words you already knew but others were new for you or some words had a different meaning than you may have thought.

Now that you have studied all of the words, I would like you to write a sentence for each word. The quality of your sentence will let me know how well you learned each of the vocabulary words.

Do you remember the example I used a couple of weeks ago for the word *famished*? Remember, “I am *famished*,” does not let me know you know that *famished* means ‘really hungry.’ But, “The dog was lost and hadn’t eaten anything for three days, so when Maggie gave him his dog dish full of food, he was *famished* and gobbled it all down,” tells me that you do understand what *famished* means.

I will say each of the vocabulary words. I want you to repeat the word aloud. Then you will have 2-3 minutes to think and write a sentence for each word. Try your best to remember what each word means and then write your sentence. You must write something down for each of the words.

Remember that some words have a couple of different meanings. For example, *vision* was one of the words you studied. *Vision* in “Antarctic Journal” did *not* mean ‘how well you can see.’ The word *vision* had a different meaning in this story so be sure your sentence uses the same word meaning that you studied.

Sentences must include the vocabulary word from the stories that you read. Illegible responses will not receive points so use your best handwriting and leave spaces between the words.

As always, your best work is expected! Any questions?

Are you ready? Here is your first word…

<table>
<thead>
<tr>
<th>Lesson 11</th>
<th>Lesson 12</th>
<th>Lesson 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Screech Owl Who Liked Television</td>
<td>The Earth Dragon Awakes</td>
<td>Antarctic Journal</td>
</tr>
<tr>
<td>presence</td>
<td>trembles</td>
<td>display</td>
</tr>
</tbody>
</table>
Scoring the Sentence Writing Task:

Some of the words from recent lessons have multiple meanings. For the posttest, students will be required to use the word meaning reflected in Lessons 11, 12, and 13. Also, if the sentence uses the singular form of the word (i.e., possession / possessions) rather than the plural form provided in Journeys and the sentence suggests a student has a clear understanding of the word, the student will receive credit.

Scoring Rules:

<table>
<thead>
<tr>
<th>Points</th>
<th>Explanation</th>
<th>Target Word</th>
<th>Sentence Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>The sentence provides no or very limited information about the meaning of the target vocabulary word.</td>
<td>famished</td>
<td>I am famished.</td>
</tr>
<tr>
<td>One</td>
<td>The word’s use in the sentence provides some, although limited information about the meaning of the target word.</td>
<td></td>
<td>I am famished every night before dinner.</td>
</tr>
<tr>
<td>Two</td>
<td>The sentence reflects a clear understanding of the target word. Sentence must be grammatically correct.</td>
<td></td>
<td>I was famished since I had not eaten anything for two days.</td>
</tr>
</tbody>
</table>
APPENDIX D

Weekly Test Data: Pretest for Vocabulary and Comprehension

Means and Standard Deviations: All Classrooms

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<tr>
<th>Classroom</th>
<th>Mean</th>
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<td>.9545</td>
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<td>.9600</td>
<td>.08208</td>
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<tr>
<td>Total</td>
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<td>.13973</td>
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<tr>
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<td></td>
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<td></td>
<td>4.00</td>
<td>.8333</td>
<td>.17416</td>
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<tr>
<td></td>
<td>5.00</td>
<td>.8400</td>
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<td>Total</td>
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<td>.14708</td>
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</tr>
<tr>
<td>PercentPreVoc2</td>
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<tr>
<td>Total</td>
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Means and Standard Deviations by Group: Control and Intervention

<table>
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<tr>
<th>Group</th>
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<th>PercentPreVoc2</th>
<th>PercentPrecomp2</th>
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<tbody>
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<td>Intervention</td>
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<tr>
<td>N</td>
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ANOVA

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<th>F</th>
<th>Sig.</th>
<th>Partial Eta Squared</th>
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<tbody>
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<td></td>
<td>PerCentPreComp1</td>
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<tr>
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<td>.091</td>
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<tr>
<td></td>
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<td>.563</td>
<td>.455</td>
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</table>