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INCIDENTAL VOCABULARY ACQUISITION IN MIDDLE SCHOOL: AN EXAMINATION OF THREE INSTRUCTIONAL CONDITIONS

by

David B. Lee

A dissertation submitted in partial fulfillment of
the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Education

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UTAH STATE UNIVERSITY
Logan, Utah

2017

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ABSTRACT

Incidental Vocabulary Acquisition in Middle School: An Examination of Three Instructional Conditions

by

David B. Lee, Doctor of Philosophy

Utah State University, 2017

Major Professor: Cindy D. Jones, Ph.D.
Department: Teacher Education and Leadership

Researchers have documented the importance of vocabulary knowledge on literacy and school success. Vocabulary knowledge is especially crucial in middle school because there is an increased vocabulary demand due to the more complex words that are introduced in middle school. Research on incidental vocabulary acquisition for middle school students has been lacking, especially with participants who speak English as a first language (L1). The purpose of this study was to compare the relative effectiveness of three instructional conditions (reading, writing, and reading *and* writing) on incidental vocabulary acquisition and retention with L1 middle school students.

In this within-subjects design, 263 participants completed the three instructional conditions. Data from 2,893 individual student measures were used to evaluate the influence of instructional conditions on incidental vocabulary acquisition and retention. Analysis of mixed-effects models showed that participant scores on the reading *and*

writing condition were consistently higher than the writing only or the reading only condition. These results indicate that instructional tasks with higher involvement loads (such as reading *and* writing or writing) offer benefits to L1 middle school students for the incidental vocabulary acquisition necessary to be academically successful. Additionally, participants' overall vocabulary size and reading proficiency had a positive impact on incidental vocabulary acquisition.

(160 pages)

PUBLIC ABSTRACT

Incidental Vocabulary Acquisition in Middle School: An Examination of Three Instructional Conditions

David B. Lee

The importance of vocabulary knowledge gained through incidental learning is well documented. The growth of incidental vocabulary knowledge is especially crucial for middle school students due to the complex words encountered in their studies. However, research on incidental vocabulary acquisition for middle school students is lacking. The purpose of this study was to compare the relative effectiveness of three instructional conditions (reading, writing, and reading *and* writing) on incidental vocabulary acquisition and retention with middle school students in an English as a first language (L1) environment.

In this within subjects repeated measure study, 263 eighth-grade participants received treatment in three instructional conditions with three differing levels of involvement load. Data from 2,893 individual student measures were used to evaluate the influence of instructional conditions on incidental vocabulary acquisition and retention. Analysis of mixed-effects models showed that participant scores on the reading *and* writing condition were consistently higher than the writing only or the reading only condition. These results indicate that instructional tasks with higher involvement loads (e.g., reading *and* writing or writing) offer benefits to L1 middle school students for the incidental vocabulary acquisition necessary to be academically successful.

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CHAPTER I

INTRODUCTION

The limits of my language mean the limits of my world
-- Ludwig Wittgenstein

Vocabulary knowledge refers to information stored in memory concerning the pronunciation and meaning of words (Snow, Burns, & Griffin, 1998) and has been shown to be a major predictor of student academic success (Antonacci & O'Callaghan, 2012; Becker, 1977; Biemiller, 1999; Carleton & Marzano, 2010; Kelley, Lesaux, Kieffer, & Faller, 2010). Researchers have documented the importance of vocabulary knowledge on a myriad of literacy skills, such as decoding, reading comprehension, and writing. Vocabulary knowledge is linked to development in decoding, as students with strong vocabulary have a rich representation of word parts to facilitate word analysis (Beck, Perfetti, & McKeown, 1982; Biemiller, 2003; National Reading Panel [NRP], 2000; Share, 1995; Share & Stanovich, 1995). Vocabulary knowledge is also a strong correlate of reading comprehension (Baumann, Edwards, Boland, Olejnik, & Kameenui, 2003; Hawkins, Hale, Sheeley, & Ling, 2011; Laflamme, 1997; Nagy & Scott, 2000; Stahl & Fairbanks, 1986). During reading, vocabulary words are introduced in context, which helps learners conceptualize and retain words (Blachowicz & Fisher, 2010; Ellis, 1994). Vocabulary knowledge is crucial for writing (Applebee, 1996; Baker, Simmons, & Kameenui, 1995; Beck, McKeown, & Kucan, 2002; Blachowicz & Fisher, 2010; Graham & Perrin, 2007; Kelley et al., 2010; Langer & Applebee, 1986; McMahon & Raphael, 1997; Newell, 2006; Newell & Winograd, 1995; Paribakht & Wesche, 1999). To

learners, writing is perceived as a meaningful task, which allows a learner to experiment with new vocabulary words and make learners more aware of the words they are using (Blachowicz, 1986; Bromley, 2003; Laufer, 2003). In general, middle school students with strong vocabulary knowledge experience significant learning advantages that extend across the curriculum (Antonacci & O'Callaghan, 2012; Beck et al., 2002; Becker, 1977; Biemiller, 1999; Carleton & Marzano, 2010; Graves, 2009; Kelley et al., 2010; National Institute of Child Health and Human Development, 2000; Scarborough, 2001).

Conversely, middle school students with low vocabulary knowledge have a decreased chance of academic success (Antonacci & O'Callaghan, 2012; Becker, 1977; Biemiller, 1999; Carleton & Marzano, 2010; Kelley et al., 2010). A lack of vocabulary knowledge is considered a more serious matter for students than a lack of other language components such as syntax (Ellis, 1994; Haratmeh, 2012; Laufer & Paribakht, 1998). According to the Carnegie Council for Advancing Adolescent Literacy (CCAAL, 2010), vocabulary knowledge is especially crucial in middle school because middle school students are exposed to highly complex words in grade-level texts, creating an increased vocabulary demand on students. If a student's vocabulary knowledge fails to meet this demand, the more complex, grade-level texts can hinder a student's ability to read and understand the information being presented. The highly complex words that students are exposed to in middle school texts, can help students "…talk efficiently about categories, about abstractions, and about causal or associative relationships" (CCAAL, 2010, p. 77), allowing students to understand and refer to basic and more advanced ideas across the curriculum.

Background of the Study

The task of teaching vocabulary knowledge is a significant responsibility for middle school teachers. It has been estimated that children are exposed to roughly ten thousand unknown words in a year (Anderson, Wilson, & Fielding, 1988; Nagy & Anderson, 1984; Nagy & Herman, 1987). In addition, even though many students are quite capable of speaking and writing in an acceptable manner, when faced with academic vocabulary, students become immersed in a language that is unfamiliar and difficult (Stahl & Nagy, 2006). As the number of unfamiliar words increases, the level of comprehension decreases. This is especially true when the reading is done in an area where a student has little background knowledge of the subject, which happens more frequently in secondary education settings (Kamil & Hiebert, 2005).

Effective vocabulary instruction has been shown to make a difference for student academic success (Scott, Jamieson-Noel, & Asselin, 2003). Vocabulary instruction helps to support students as they embark on assignments requiring writing or reading (Kelley et al., 2010). If there is a lack of vocabulary instruction, or the instruction does not meet the needs of increasing vocabulary knowledge required, then students' ability to understand grade-level text suffers (Kelley et al., 2010; Stahl, 2005). In addition, researchers have shown that there is a "vast difference in the vocabularies of low- versus high-achieving students" (Carleton & Marzano, 2010, p. 2). In middle school and above, this gap becomes exacerbated due to the increased complexity and content-specific vocabulary that students are expected to know and the lack of vocabulary instruction in many secondary classrooms (Beck et al., 2002; Blachowicz, 1986; Blachowicz & Fisher, 2000;

Graves, 2009; Kelley et al., 2010). A lack of attention to effective vocabulary instruction tends to widen the vocabulary knowledge gap, which disproportionately favors some students and hinders others, such as those struggling with reading or from low socioeconomic backgrounds (Beck et al., 2002; Blachowicz & Fisher, 2000; Scott et al., 2003).

Indeed, vocabulary instruction in middle school is often overlooked (Beck et al., 2002; Blachowicz, 1986; Blachowicz & Fisher, 2000; Graves, 2009; Kelley et al., 2010). Scott et al. (2003) reported that only 6% of instructional time in language arts classes was used for vocabulary acquisition and only 1.4% of instructional time in non-language arts classes. Beck et al. suggested that much of the gap of vocabulary knowledge remains in upper grades, not because it is impossible to close the gap, but because there is not a strong focus on vocabulary acquisition. To help middle school students acquire the vocabulary knowledge necessary for success in literacy activities, a multifaceted instructional approach is needed that includes a focus on incidental vocabulary acquisition (vocabulary knowledge that is gained incidentally through the conscious or unconscious use of vocabulary acquisition strategies).

Many researchers have emphasized that incidental learning of vocabulary words is effective and necessary to increase one's vocabulary (Beal, 2007; Brown, Waring, & Donkaewbua, 2008; Gass, 1999; Huckin & Coady1999; Hulstijn, 2003; Laufer, 2001; Nagy, Herman, & Anderson, 1985). Hulstijn stated that when incidental vocabulary instruction is used, students "pick up" words "simply by engaging in a variety of communicative activities, in particular reading and listening activities, during which the

learner's attention is focused on meaning rather than the form of language" (p. 349). Explaining the advantages of incidental learning of vocabulary, Huckin and Coady (1999) noted: (1) words can be learned in the context they are used, providing an opportunity for learners to gain a deeper sense of the word and its meaning; (2) it is more efficient, in that two activities are being conducted at the same time (reading and vocabulary learning); and, (3) it allows for a more individualized learning experience for the student. It also offers the student a chance to choose their own reading materials and, in essence, choose the words to which they will be exposed.

Although increasing middle school students' vocabulary knowledge is typically considered the responsibility of language arts teachers, vocabulary acquisition must be a regular occurrence in all middle school classrooms to improve students' language skills, support reading comprehension, advance student writing abilities, and increase motivation for success in academic settings (Kelley et al., 2010; Lesaux, Harris, & Sloane, 2012; Vaughn, Swenson, & Roberts, 2013). Fortunately, a focus on incidental vocabulary acquisition offers affordances for vocabulary growth across the curriculum and in all middle school classrooms.

Statement of the Problem

Although it is essential for development of strong vocabulary knowledge, research on incidental vocabulary acquisition for middle school students is relatively disregarded (Beck et al., 2002; Blachowicz, 1986; Blachowicz & Fisher, 2000; Graves, 2009; Kelley et al., 2010; Read, 2000). Instead, the primary focus of vocabulary research

has been on direct instruction. This is despite the fact that most researchers believe the majority of vocabulary is acquired through incidental methods (Alemi, & Tayebi, 2011; Eckerth & Tavakoli, 2012; Hill & Laufer, 2003; Huckin & Coady, 1999; Hulstijn, 2003). Rather than disregard the importance of incidental vocabulary acquisition, a multifaceted approach to vocabulary acquisition seeks to enhance incidental vocabulary acquisition through a variety of activities (Mcgee & Richgeis, 1990; Shanahan, 1990, 1997, 1998; Stahl & Fairbanks, 1986). Reading has been shown to enhance vocabulary acquisition because of the context with which the words are introduced to the learner (Blachowicz & Fisher, 2010; Stanovich, West, Cunningham, Cipielewski, & Siddiqui, 1996). Writing has been shown to enhance vocabulary acquisition by allowing learners to use vocabulary words in an authentic and meaningful manner that is within the learner's abilities (Bromley, 2003; Graham & Perrin, 2007; Langer & Applebee, 1987; Laufer, 2003; Kelley et al., 2010). Clearly, incidental vocabulary acquisition is a necessary component of effective vocabulary instruction (Baumann, Font, Edwards, & Boland, 2005; Graves & Prenn, 1986; Nagy, 2005; Doughtery-Stahl & Bravo, 2010).

Purpose and Research Questions

The importance of vocabulary knowledge for middle school students is well known (Antonacci & O'Callaghan, 2012; Becker, 1977; Biemiller, 1999; Carleton & Marzano, 2010; Kelley et al., 2010). The demands placed upon middle school students to effectively use increasingly complex vocabulary in reading, writing, and speaking across the curriculum cannot be met by direct instruction alone. Considering that students are

exposed to incidental vocabulary learning, it is imperative middle school students and teachers reap the benefits of incidental vocabulary acquisition. However, few studies have been conducted about incidental vocabulary acquisition with L1 middle school students, partially because incidental vocabulary acquisition in L1 is thought to be a natural development of language. However, researchers have noted that incidental vocabulary acquisition is important for L1 learners (Grabe, 2004; Paribakht & Wesche, 1997; Read, 2000 Rott, 1999). Therefore, a better understanding of incidental vocabulary acquisition for L1 middle school students is needed. It has been suggested that incidental vocabulary acquisition occurs through reading. Research has indicated that incidental vocabulary acquisition can also occur through writing. There is also research that suggests that combining tasks in conjunction with reading may have a positive effect on middle school students' incidental vocabulary acquisition. Therefore, the purpose of this study is to compare the relative effectiveness of three conditions for incidental acquisition and retention of new vocabulary with middle school students in an L1 environment. Specifically, this study investigated the following.

1. For L1 eighth-grade students, does the instruction condition (reading, writing, reading *and* writing) affect initial incidental vocabulary acquisition gains?
2. For L1 eighth-grade students, are there significant differences in incidental vocabulary retention rates based on instructional condition (reading, writing, reading *and* writing)?
3. For L1 eighth-grade students, what is the relationship between students' overall vocabulary size, reading proficiency, and incidental vocabulary gains?

Significance

Vocabulary knowledge is crucial for successful reading and writing (Beck et al., 1992; Browne, 2003; Nagy, 1988; Ryland, Aukrust, & Fulland, 2012; Webb, 2005). In middle school, there is an increased demand of vocabulary acquisition due to the more complex texts that secondary students are exposed to (Beck et al., 2002; Blachowicz, 1986; Blachowicz & Fisher, 2000; Graves, 2009; Kelley et al., 2010). Because the majority of word knowledge comes from incidental vocabulary acquisition, strategies that are focused on developing incidental vocabulary acquisition in middle school are important.

Additionally, more research is needed about incidental vocabulary knowledge acquisition in order for educators to make informed instructional decisions (Allen, 2007; Baumann et al., 2003; Gardner, 2004; Graves, 2009). This study compared the impact of reading, writing, and reading *and* writing strategies on vocabulary acquisition, while giving insight into the most effective strategies for vocabulary acquisition. Identification of how literacy activities enhance incidental vocabulary acquisition could prove beneficial to middle school students, to language arts teachers, and to teachers across the curriculum and grade levels.

Definition of Key Terms

For the purpose of this study, the following terms and definitions will be used.

Vocabulary knowledge: The gradual growth that occurs from the first exposure to the understanding and correct usage of a word (Hirsch, 2003); as well as a prerequisite factor to reading comprehension (Haratmeh, 2012; Paribakht &

Wesche, 1997).

Incidental vocabulary acquisition: Words that are learned as a by-product of another activity are considered learned incidentally. Learning the target words is not the primary focus of the activity. However, words can be attended to and still be considered incidental learning (Ellis, 1994; Gass, 1999; Hulstijn, 2003)

Intentional vocabulary acquisition. Words that are learned as a result of direct and specific instruction of the meaning of the words are considered to be learned intentionally (Alemi & Tayebi, 2011; Hulstijn, 2003).

Summary

The importance of vocabulary knowledge for middle school students is well known. Indeed, vocabulary knowledge is a strong predictor of students' academic success. Effective vocabulary instruction has been shown to make a difference for student academic success. Vocabulary knowledge instruction is especially important in middle school as students are exposed to more complex words, which students must understand in order to be active participants in the curriculum. Incidental vocabulary acquisition may be the key to increased learning for middle school students. Thus, this study examined the impact of three instructional conditions on incidental vocabulary acquisition among L1 eighth-grade students.

CHAPTER II

REVIEW OF THE LITERATURE

Researchers agree that the vast majority of words students learn can be attributed to incidental vocabulary acquisition (Beal, 2007; Brown et al., 2008; Gass, 1999; Huckin & Coady, 1999; Hulstijn, 2003; Laufer, 2001; Nagy et al., 1985). Incidental vocabulary acquisition is commonly described as a process of learning new words while being engaged in other activities. Words are learned incidentally from exposure with the context in which the words are presented (Gass, 1999; Hulstijn, 2003; Laufer & Hulstijn, 2001). The more the learner is exposed to the unknown word, the more the understanding of the word increases (Scwanenflugel, Stahl, & McFalls, 1997).

Research on incidental vocabulary acquisition has primarily focused on acquiring vocabulary incidentally, through reading (Nagy & Anderson, 1984; Paribakht & Wesche, 1997). However, the question arises if reading is the most effective option for incidental vocabulary acquisition (Laufer, 2003)? Unfortunately, limited research has been conducted regarding incidental vocabulary acquisition, beyond reading. There is a need for research on incidental vocabulary acquisition through writing and through reading *and* writing approaches. Furthermore, much of the research conducted about incidental vocabulary acquisition has focused on second language learner (L2) students at the post-secondary level; few studies have conducted research among middle school students who are first language learners (L1) in traditional English classes (Read, 2000). Given the importance of incidental vocabulary acquisition for all students, the paucity of research is striking.

The purpose of this review is to evaluate and synthesize research that has been conducted on incidental vocabulary acquisition. The review will first present the theoretical framework for this study and impact that the Involvement Load Hypothesis (ILH) has on incidental vocabulary acquisition. This review will then present the research on incidental vocabulary acquisition through reading, incidental vocabulary acquisition through writing, and incidental vocabulary acquisition through reading *and* writing, with an emphasis on research that is specific to L1 middle school students.

Procedures of Literature Review

A review of the literature concerning incidental vocabulary acquisition included a search of the following search databases: Academic Search Premier, Google Scholar, EBSCO host, ProQuest Dissertations & Theses, and PsychINFO. For the searches conducted, the descriptors were used in the following combinations: incidental vocabulary acquisition, incidental vocabulary acquisition and reading, incidental vocabulary acquisition and writing, incidental vocabulary acquisition and reading and writing. Information used was found from the following journals: *American Educational Research Journal, Applied Linguistics, The Canadian Modern Language Review, Educational Psychologist, English Language Teaching, Harvard Educational Review, International Journal of Academic Research, Journal of Adolescent & Adult Literacy, Journal of Communication Discourses, Journal of Curriculum Studies, Journal of Experimental Psychology: General, Journal of Reading, Journal of Verbal Learning and Verbal Behavior, Language Teaching Research, The Psychology of Learning and*

Motivation, Psychology in the Schools, The Modern Language Journals, Language Learning, Second Language Research, Reading in a Foreign Language, The Reading Teaching, Reading Research Quarterly, Review of Educational Research SSLA, and *TESOL Quarterly.* In addition, information was collected from the following handbooks: *The Handbook of Writing Research, Handbook of Research on Teaching the Language Arts, The Handbook of Second Language Acquisition, The Handbook of Reading Research, Handbook of Adolescent Literacy Research, Handbook of Research in Middle Level Education: Research on Teaching and Learning with the Literacies of Young Adolescents.*

Research included in the review of the literature met the following criteria:

1. Studies published in a peer reviewed journal
2. Studies conducted after 1990 (except for a few seminal cases)
3. Studies that examined incidental vocabulary acquisition.

Theoretical Framework

The theoretical framework used for the current study is based on the Involvement Load Hypothesis (Laufer & Hulstijn, 2001). The Involvement Load Hypothesis (ILH) was chosen because it has been recommended that the ILH be used in word-based instructional tasks to improve incidental vocabulary acquisition (Laufer, 2003) and the level of involvement in an activity can positively impact the learning of unknown words among students (Huang, Eslami, & Willson, 2012; Laufer & Hulstijn, 2001). This review will first present how the roots of the ILH are based in cognitive psychology. The review

will then present how the ILH is based on ideas evolved from information-processing theory and depth of processing theory. Lastly, the implications of ILH for the current research study will be presented.

Information-Processing Theory

The information-processing theory helps to explain what happens mentally in activities such as incidental vocabulary acquisition (Tracey & Morrow, 2012). Slavin (2003) described information-processing theory as "the cognitive theory of learning that describes the processing, storage, and retrieval of knowledge from the mind" (p. 173). Atkinson and Shiffrin (1968) created a model of processing, storing, and retrieving; Figure 1 is an information-processing model, adapted from the model presented by Atkinson and Shiffrin.

The general idea behind the information-processing theory is that information moves through a process or system like a computer (Atkinson & Shiffrin, 1968) with inputs, processing, and outputs. Once the input is sensed and some attention is given, the

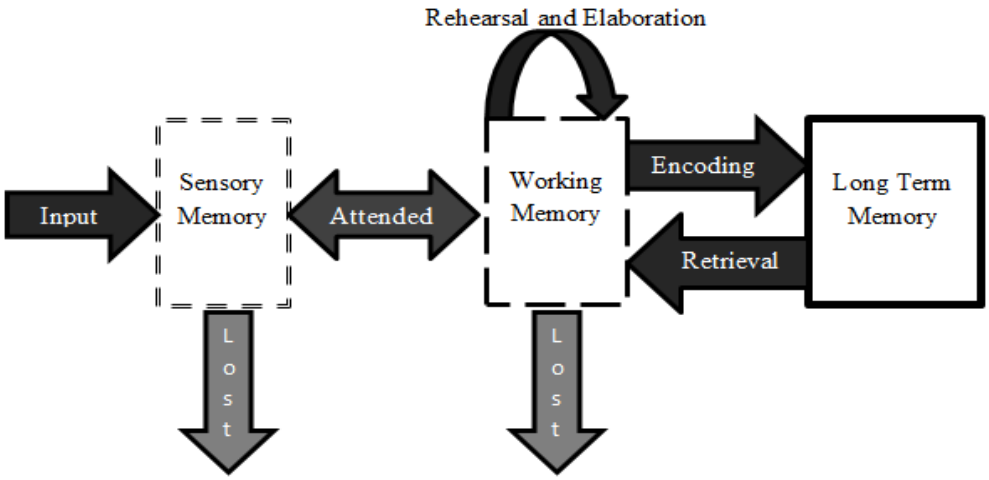

Figure 1. A model of information processing.

information is moved to working memory. If the information in working memory is rehearsed or elaborated upon in some way, the information has a greater chance of being committed to long-term memory where it can be recalled for future use (Atkinson & Shiffrin, 1968; Raajimakers & Shiffrin, 2003; Tracey & Morrow, 2012). If the information is not rehearsed or elaborated upon, it is likely that the information becomes lost and forgotten.

To keep information available for retrieval from long-term memory, information is moved from the sensory memory into working memory and then is combined with information already stored in long-term memory, in order to create meaning. During this process, rehearsal becomes important in creating what Driessen, Westhoff, Haenen, and Brekelmans (2008) described as "traces of mental actions in working memory" (p. 805). These traces assist in the retrieval of information from the long-term memory. Retrieval is further helped when a task is given sufficient attention through elaboration or manipulation of the information while in the working memory (Driesson et al., 2008). Hulstijn and Laufer (2001) emphasized that many cognitive psychologists "…agree that processing new lexical information more elaborately will lead to better retention than if it had been processed less elaborately" (p. 541).

Depth of Processing

Researchers have suggested that the level of processing (shallow or deep) influences the amount of information remembered and that memory is not a fixed model, but that memory occurs *due to* processing information (Craik & Lockhart, 1972; Craik & Tulving, 1975). Shallow processing occurs when recognizing the shapes of the letters and

words (structural) or when learning the sounds of the letters or words (phonemic). Deep processing occurs when meaning of the word is being learned, which leads to stronger retention. Figure 2 shows a model of depth of processing theory.

Depth of processing for words can be increased by paying attention to how words are spelled and pronounced, learning the meaning of the words, and by elaborating upon words (e.g., participating in writing activities that include words to be learned). With an increased depth of processing, the amount of word knowledge retained should be increased (Baddeley, 1997, 2003; Laufer & Hulstijn, 2001; Shu et al., 1995; Stahl & Fairbanks, 1986). However, researchers have noted that it has been difficult to precisely measure and define varying levels of depth and whether an activity has more depth of processing over another (Baddeley, 1978, 2003; Craik & Tulving, 1975; Folse, 2006; Hulstijn & Laufer, 2001; Kim, 2008; Stahl & Fairbanks, 1986).

Involvement Load Hypothesis

Hulstijn and Laufer (2001) presented the ILH to explain how a word stored in

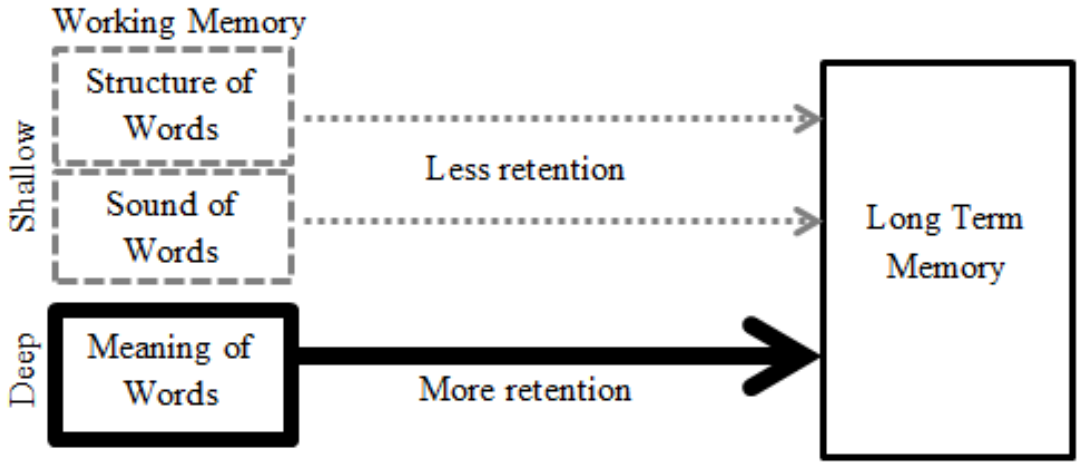

Figure 2. How memory of words is created in depth of processing.

long-term memory can be attributed to the depth in which it was processed (Browne, 2003; Kim, 2008). The ILH features three components of involvement: *need, search*, and *evaluation* (Hulstijn & Laufer, 2001; Kim, 2008). Studies that have used the ILH have measured the amount of involvement in a task by including an involvement load score (ILS). Each aspect of the task (*need, search, evaluation*) is given a score of 0 (absent), 1 (moderate), or 2 (strong). The scores are then summed to create an overall involvement load score for the task being completed (Hulstijn & Laufer, 2001; Kim, 2008).

Need. Need is part of the motivation of a task and is non-cognitive in nature. Need is the rationale for learning words in a task and is required for successful completion of the word learning task. A task can have two levels, moderate presence and strong presence. Need is considered to have a moderate presence (ILS 1) when the need is extrinsically motivated. Need is considered to have a strong presence (ILS 2) when the need is intrinsically motivated. It would be impossible for need to be absent (ILS 0) from a task, because if there is no need, then there is no task (Hulstijn & Laufer, 2001; Kim, 2008).

Search. Search is one of cognitive tasks of the ILH. Search refers to the task of looking up the meaning of unknown words. Search is considered either to be present (ILS 1) or to be absent (ILS 0) and does not require a differentiation between moderate or strong presence (Hulstijn & Laufer, 2001; Kim, 2008).

Evaluation. Evaluation is the other cognitive task within the ILH. This component is where learners make decisions about target words. By using the context of the words, learners compare and contrast the meaning of the unknown word with the

surrounding words to make decisions about meaning and usage of unknown words. Evaluation can be considered absent (ILS 0), a moderate presence (ILS 1), or a strong presence (ILS 2) during a task (Hulstijn & Laufer, 2001; Kim, 2008). Figure 3 presents how the level of involvement impacts retention of vocabulary.

Instructional Implications

It has been stated that students acquire most new words incidentally, with the level of involvement impacting the learning of unknown words (Huang et al., 2012; Laufer & Hulstijn, 2001). Furthermore, Laufer (2003) recommended that the ILH be used in word-based instructional tasks to improve incidental vocabulary acquisition. Researchers have recommended examining the ILH in different contexts (Laufer & Hulstijn, 2001; Marmol & Sanchez-Lafuente, 2013). ILH has been recognized as a comprehensive and effective framework when analyzing vocabulary-teaching

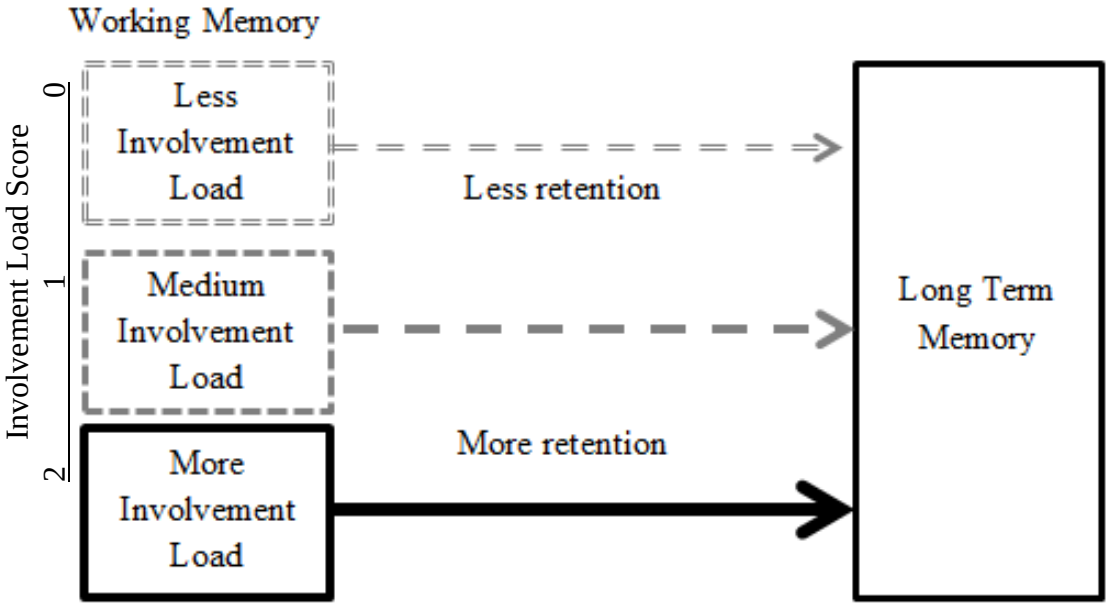

Figure 3. How words are retained, according to the ILH.

strategies. ILH allows tasks like reading and writing to be quantified and analyzed to determine how incidental vocabulary acquisition is impacted by instructional conditions. Previous research has suggested that incidental vocabulary acquisition can happen in reading, writing, and reading *and* writing. With these instructional conditions being the emphasis of the current study, ILH is an ideal framework for the study.

Incidental Vocabulary Acquisition Through Reading

Reading is an "ideal medium" for acquiring vocabulary (Ellis, 1994). While reading, a learner will be exposed to unknown words (Pulido, 2007). In order to fully comprehend the text, the learner needs to be able to determine the meaning of the unknown words (Blachowicz & Fisher, 2010). Nagy and Scott (2000) suggested that reading facilitates incidental vocabulary acquisition by giving readers two sources of information that can help them learn unknown words: the familiar words that surround the unfamiliar word (context) and the lexical characteristics (e.g., number of letters, frequency, familiarity, type of word, etc.) of the word. A learner can use this information to gain an understanding of the unknown word, without actively or specifically studying the word (Graves, 2009; Nagy, Anderson, & Herman, 1987). Nagy and Anderson (1984) emphasized that most vocabulary is learned incidentally through reading.

Review of Incidental Vocabulary Acquisition Through Reading

The search for previous research about incidental vocabulary acquisition yielded 49 articles, which were evaluated for relevancy to the current study. Forty-seven were

research studies; one was a meta-analysis and one a literature review. This review will evaluate and synthesize information from these studies in regard to participants, design and analysis, measures used to evaluate acquisition, and factors shown to affect incidental vocabulary acquisition through reading.

Participants. Study participants were analyzed in regard to grade level, native language, and sample size. Of the 47 studies, 31 were conducted with post-secondary students; this was the most commonly studied student population. Only five studies were conducted with middle school students, grades 7-8 (Harmon, 1998, 1999; Hermon, Anderson, Pearson, & Nagy, 1987; Neuman & Koskinen, 1992; Tajeddin & Dararee, 2013). High school students, grades 9-12, were the target population in five studies (Gablasova, 2014; Laflamme, 1997; Min, 2008; Song & Sardegna, 2014; Turk & Ercetin, 2014). In six studies, participants were either in preschool (McLeod & McDade, 2011), third grade (Shu et al., 1995) or fifth grade (Baumann et al., 2003; de Leeuw, Segers, & Verhoeven, 2014; Marmol-Sanchez & Lafuente, 2013; Shu et al., 1995).

A majority of the research (39 out of 47 studies) conducted on incidental vocabulary acquisition through reading was conducted with participants who were L2. Participants who were L1 were used in three of the five studies conducted with middle school students (Harmon, 1998, 1999; Herman et al., 1987). Herman et al. experimented with how informational text features affected incidental vocabulary acquisition for L1 middle school students. Harmon (1998, 1999) used qualitative studies to investigate the strategies used by middle school students when they are exposed to unfamiliar words. Table 1 shows an overview of studies by grade level and language.

It is interesting to note that the scarcity of research on incidental vocabulary acquisition among middle school students. It has been suggested that vocabulary acquisition is often researched in L2 because L1 incidental vocabulary acquisition is "developed naturally" as children grow older, and L2 incidental vocabulary acquisition is learned more through written text (Grabe, 2004). Yet, researchers have noted the importance of incidental vocabulary acquisition through reading for *all* learners; there is a need for experimental research in order to better understand incidental vocabulary acquisition for L1 middle school students (Paribakht & Wesche, 1999; Rott, 1999). Because of the lack of previous research with L1 middle school students, studies of incidental vocabulary acquisition through reading, but not set in a middle school environment, will be used in this review to promote a better understanding of the topic and study design.

The studies located had a wide range of sample sizes, which can be attributed to the fact that this review included qualitative and quantitative studies. The study with the largest sample size was a quantitative with 487 participants (Shu et al., 1995). The

Table 1

Analysis of Participants in Incidental Vocabulary Acquisition and Reading Research

Grade level	L1	L2
Post-secondary	3	28
High school	2	3
Middle school	3	2
Elementary	5	2

Note. Some studies were based in both L1 and L2.

smallest study was a qualitative study with one participant (Hu, 2013). Descriptive statistics for the sample sizes from the 47 studies are presented in Table 2.

The three studies conducted with L1 middle school students had an average sample size of 140 participants; however, the median was six. Two of the three studies were qualitative studies. One of the qualitative studies had a sample size of six (Harmon, 1998) and the other qualitative study had a sample size of two (Harmon, 1999). The remaining L1 middle school study had a sample size of 413 participants (Herman et al., 1987), gathered from three junior high schools. Of the reviewed research, there was only one quantitative study that had L1 middle school students as participants.

Design and analysis. In total, only three experimental studies and two case studies have examined incidental vocabulary acquisition through reading with middle school students. An overview of the research design and analysis for the 49 studies of IVA through reading is presented in Table 3.

Table 2

Sample Size Descriptive Statistics for Incidental Vocabulary Acquisition and Reading

Descriptive statistic	All	MS	All L1	All L2	MS L1	MS L2
M	90.36	120.00	126.09	79.14	140.33	89.50
Median	64.00	50.00	56.00	69.00	6.00	89.50
SD	95.80	171.57	166.47	58.76	236.14	55.86
Range	1-487	2-413	2-487	1-248	2-413	50-129
Number of articles	47	5	11	36	3	2

Table 3

Research Design and Analysis for Incidental Vocabulary Acquisition and Reading

Characteristics of reviewed research	Total	L2	L1	MS	MS L1
Design type					
Experimental	40	33	9	3	1
Quasi-experimental	3	2	1	0	0
Case study	3	1	2	2	2
Meta-analysis	2	0	2	0	0
Literature review	1	1	0	0	0
Control strategy					
Pretest-posttest	12	10	3	1	0
Within-subject	7	7	0	0	0
Between-subject	1	1	0	0	0
Latin square/counterbalance	2	0	2	0	0
Statistical analysis	1	0	1	0	0
No condition	1	1	0	0	0
Type of analysis					
Independent *t* test	8	7	1	0	0
Paired *t* test	4	3	1	0	0
Pearson correlation	2	2	0	0	0
Kruskal-Wallis comparison	1	1	0	0	0
Mann-Whitney U Test	1	1	0	0	0
ANOVA	10	10	0	1	0
ANCOVA	4	4	0	1	0
MANOVA	3	3	0	0	0
MANCOVA	1	1	0	0	0
Repeated Measures ANOVA	6	4	2	0	0
Regression	4	1	3	1	1
Linear Mixed-effects	2	0	2	0	0

Note. Some studies used L1 and L2.

This review of literature located only one experimental study of incidental vocabulary acquisition through reading for L1 middle school participants (Herman et al., 1987). The purpose of this study was to investigate how certain text features affect incidental vocabulary acquisition while reading. Four hundred thirteen participants were

randomly given one of two texts. Participants were randomly but equally given one of the texts that was either unaltered, or altered in one of three ways: (1) renaming titles of sections to be more explicit, (2) removing unessential information, or (3) adding information to clarify the most important information. Participants completed a multiple-choice test to measure incidental vocabulary acquisition. Results of a hierarchal regression showed the probabilities of learning new words for each type of text (Table 4).

The results suggested that the participants who were given the elaborated text had the highest probability of incidentally learning target words. The implications of these results are that using a text that highlights or elaborates on important information within the text can lead to greater gains in incidental vocabulary acquisition.

Measures of vocabulary acquisition. Read (2000) stated that assessments such as multiple choice, gap-fill, and matching are often used for measuring vocabulary acquisition; these assessments are often used due to the ease of creation and scoring. In the research reviewed for this study, the most common measures for vocabulary

Table 4

Probability of Learning Target Words Based on Text Feature

Text	Probability
Original Text: Approximately 1000 words were taken from a junior high science textbook.	.23
Altered Text 1: Title, topic sentences and organization were enhanced	.21
Altered Text 2: The same alterations as Altered Text 1 were made *and* information and relationships were made more explicit.	.17
Altered Text 3: The same alterations as Altered Text 1 and 2 were made *and* key information in the text was elaborated on.	.29

acquisition were multiple choice, checklist, and Vocabulary Knowledge Scale (VKS). Table 5 presents the measures used for vocabulary acquisition, whether those measures were given to L1 or L2 participants, and if the participants were in middle school or not.

***Multiple-choice*.** Eleven studies used a multiple-choice assessment to measure student vocabulary acquisition. Seven of those used questions that included five possible answers to the question. The options included the correct answer, three distractors, and an option for "I don't know" (Ajideh, Rahimpour, Amini, & Farrokhi, 2013; Brown et al., 2008; Herman et al., 1987; Joe, 1998; Rott, 1999; Shu et al., 1995; Yali, 2010). In two

Table 5

Measures to Assess Incidental Vocabulary Acquisition and Reading

Measure used	Total	L2	L1	MS	MS L1
Multiple choice definitions	13	11	3	2	1
Checklist	10	9	2	2	1
VKS	7	7	0	0	0
Define target words	6	6	0	0	0
Translate target words	4	5	0	1	0
Vocabulary Levels Test	2	2	0	0	0
Computer Adaptive Test	1	1	0	0	0
Match target words with definition	1	1	0	0	0
Interview	2	1	1	0	0
Language Strategy Use Inventory	1	1	0	0	0
Gap-fill	1	1	0	0	0
Picture-word identification	1	0	1	0	0
Use target words in sentence	1	1	0	0	0
Word Associates Test	1	1	0	0	0
Vocabulary Size Test	1	1	0	0	0

Note. Many studies used more than one measure. Some studies were both L1 and L2.

studies, participants were asked questions about the target words and were given four options to choose from; one was the correct answer and three were distractors (Baumann et al., 2003; Neuman & Koskinen, 1992). Four studies assessed each target word twice per assessment, one lower level question and one higher-level question. This was done in order to measure the level of word knowledge, as that is as a common criticism of using multiple-choice questions as a measure for vocabulary acquisition (Herman et al., 1987; Joe, 1998; Neuman & Koskinen, 1992; Reynolds & Bai, 2013).

Checklist. To complete the checklist assessment, participants were typically given a list of target words along with distractors (Gablasova, 2014; Herman et al., 1987; Hulstijn, Hollander, & Greidanus, 1996; Shu et al., 1995; Rott, 1999; Turk & Ercetin, 2013). Participants were asked to identify whether they had heard or seen a word before. Most studies asked for a yes or no answer; however, one study added a third option of "not sure" (Kweon & Kim, 2008) and one added a choice of having seen the word, but not knowing what it meant (Gablasova, 2014). Another study (Turk & Ercetin, 202014) asked participants to simply circle the words they recognized from a list. Because it is difficult to check for differing levels of knowledge with checklist tests, many studies reviewed used a checklist assessment for pretests only (Gablasova, 2014; Herman et al., 1987; Neuman & Koskinen, 1992; Shu et al., 1995; Rott, 1999).

Vocabulary Knowledge Scale. Seven studies used the Vocabulary Knowledge Scale (VKS) as a measurement for vocabulary acquisition (Ehsanzadeh, 2012; Joe, 1998; Kim, 2008; Marmol & Sanchez-Lafuente, 2013; Min, 2008; Rott, Williams, & Cameron, 2002; Vidal, 2011). VKS is a measure introduced by Wesche and Paribakht (1996) in

which participants self-report their knowledge of vocabulary items. For each word, participants answer a series of questions that show different levels of knowledge. The questions that show the levels of knowledge are as follows.

Level 1: I don't remember having seen this word before.

Level 2: I have seen this word before, but I don't think I know what it means.

Level 3: I have seen this word before, and I think it means _____.

Level 4: I know this word. It means _____.

Level 5: I can use this word in a sentence: _____.

VKS is based on Dale's (1965) incremental stages of learning. To determine the reliability of VKS, Wesche and Paribakht (1996) used a test-retest administration of the VKS, given two weeks apart. The researchers reported a test-retest Pearson correlation score of .89 between students' self-reported scores and the actual score received on the VKS. Furthermore, a correlation of perceived knowledge and actual scores of vocabulary knowledge resulted in scores all above .95 in four different topics: environment, biological revolution, media, and fitness (Doughtery-Stahl & Bravo, 2010; Wesche & Paribakht, 1996). Based on these results, Doughtery-Stahl and Bravo (2010) stated that VKS could be an effective assessment to measure vocabulary growth before, during, and after a treatment.

Factors Shown to Affect Incidental Vocabulary Acquisition Through Reading

The research conducted on incidental vocabulary acquisition through reading has sought to investigate several variables that can affect incidental vocabulary acquisition

through reading. Task involvement, type of text, frequency of word exposures, type of word used, and providing glosses in the text were all discussed as variables that impacted incidental vocabulary acquisition in reading (Table 6). Each of these variables will be analyzed to aid design of the current study.

Task involvement. From the research reviewed, task involvement included such activities as answering comprehension questions, summarizing a text, completing a gap-fill activity, and searching for vocabulary words and their meaning. There was only one study (Tajeddin & Dararee, 2013) that focused on task involvement and its effect on incidental vocabulary acquisition with middle school participants. In this study, 45 L2 students were assigned to three groups. Each group read the same informational text, but was assigned a different task afterwards. After reading the text, Group 1 was given a list of the target words and definitions and asked to match the target words with the meaning of the word. Group 2 read the target words in sentences and then answered true/false questions containing the target words. Group 3 (control) read the text and answered

Table 6

Variables Shown to Impact Incidental Vocabulary Acquisition and Reading

Variable	Number of studies
Task involvement	18
Type of text	9
Frequency of word exposures	4
Types of words used	3
Glosses	2

Note. All studies reviewed used variables in relation to incidental vocabulary acquisition and reading. Some articles used more than one variable.

comprehension questions; the target words were not emphasized. The researchers found that all three tasks lead to some vocabulary acquisition. A one-way ANOVA showed a difference in group means, $F(2, 44) = 9.74$, $p < .05$. A post-hoc Scheffe test showed significantly less vocabulary acquisition for the control group compared to the two intervention groups. Results of this study are in agreement with the research conducted outside of middle school students, which has shown when there is higher involvement required to complete the task, there is a greater possibility of increasing incidental vocabulary acquisition (Hulstijn & Laufer, 2001; Kim, 2008; Laufer, 2003; Marmol & Sanchez-Lafuente, 2013).

Of the studies that focused on incidental acquisition through reading, task involvement was the most common variable studied; yet, no studies have examined the impact of task involvement for L1 middle school students. This limited focus, as well as the overall limited nature of studies in middle schools, shows a strong need for research that addresses this variable.

Type of text. Nineteen studies on incidental vocabulary acquisition through reading used texts that were fictional; most of these were fictional narratives, which included novels, short stories, and children's books. One advantage of using fictional texts for incidental vocabulary acquisition is that they provide an authentic experience that readers might actually encounter outside of the study, which can give a more accurate understanding of how learners deal with and use real texts. (Kweon & Kim, 2008; Pellicer-Sanchez & Schmitt, 2010; Pulido, 2003). Fictional texts were often used in the studies reviewed on incidental vocabulary acquisition because it was suggested they

provide a more favorable learning environment (Ehsanzadeh, 2012; Gardner, 2004; Pulido, 2003, 2007; Rott et al., 2002). Research has shown that a text should contain at least 95% familiar words for a learner to successfully understand the meaning of unknown words while reading (Ehsanzadeh, 2012; Gardner, 2004; Pulido, 2003, 2007). Gardner suggested that fictional texts more frequently meet this requirement as they contain a higher percentage of high frequency words and a lower percentage of technical or unique words. In addition, fictional texts are useful in incidental vocabulary learning because participants do not require as much background knowledge to understand the text (Ehsanzadeh, 2012; Rott et al., 2002). It has also been suggested that fictional texts are more interesting and provide more motivation for students (Barnett, 1989; Currie, 1997).

Frequency of word exposures. The number of exposures a student has with unknown words has been shown to be a factor in incidental vocabulary acquisition (Laflamme, 1997; Pellicer-Sanchez, & Schmitt, 2010; Rott, 1999; Stahl & Fairbanks, 1987). The more a learner is exposed to the word, the more likely they are to learn the word (Brown et al., 2008; Daskalovska, 2014; Hulstijn et al., 1996; Laflamme, 1997). However, de Leeuw et al. (2014) stated that a single exposure can help with acquiring and retaining word knowledge—*if* the word is learned through higher-level tasks. More research needs to be conducted to determine if minimal exposures can lead to incidental vocabulary acquisition.

Types of words used. Nouns, verbs, adjectives, and adverbs were the types of words used for target words in the studies reviewed. Brown et al. (2008) selected nouns and adjectives for their study with L2 university students. Nouns were used nouns due to

the research conducted by Higa (1965), Laufer (1997), and Rodgers (1969), which indicated that nouns and adjectives are typically easier to learn than verbs or adverbs. Kweon and Kim (2008) investigated, in part, how word type effects incidental vocabulary acquisition. They suggested that when compared to verbs or adjectives, nouns were the easiest type of word to learn incidentally. McLeod and McDade (2011) identified possible differences in the acquisition of nouns and verbs. In their study, participants read and listened to storybooks and were then given a multiple-choice posttest. Results indicated that nouns were more easily acquired than verbs (d = .69). These results show that using nouns as the words to be learned can help to promote incidental vocabulary acquisition.

Providing glosses for unknown words. A gloss is where unknown target words are supplemented with definitions, typically given in the margins of the text. Two of the reviewed studies explored whether marginal glosses impacted incidental vocabulary acquisition. Hulstijn et al. (1996) studied the difference between using a dictionary during reading, and providing glosses. In the study, participants were required to read a text with unknown words. In one text, the definitions were provided in the glosses; in the other, participants were given a dictionary and told to look up unknown words when they came across them. After administering a posttest that required recognition and recall of target words, it was found that the participants who used marginal glosses had statistically greater acquisition of target words, $F(1, 75) = 48.49$, $p < .001$. than those participants who used dictionaries.

Likewise, Rott et al. (2002) explored the impact of glosses on incidental

vocabulary acquisition. Participants were randomly assigned to be part of the control group, text reconstruction group, gloss only group, or gloss plus reconstruction group. The participants were given two assessments, the VKS and the Word Recognition Test (WRT) to measure student vocabulary gains. The results of this study showed that on the VKS, the gloss plus reconstruction group (M = 13.67, SD = 1.92) and the gloss only group (M = 12.79, SD = 2.39) had higher scores when compared to the reconstruction only group (M = 9.20, SD = 3.47) and control group (M = 9.09, SD = 3.47). Similar results were seen on the WRT where the gloss plus reconstruction group and (M = 3.42, SD = .79) the gloss only group (M = 2.93, SD = .99) outperformed the reconstruction only group (M = 2.53, SD = .83) and the control group (M = 1.97, SD = 1.22). The Hulstijn et al. (1996) and Rott et al. (2002) studies revealed that providing glosses in reading texts had a positive impact on the amount of incidental vocabulary acquisition gained by learners. These results suggest that studies exploring incidental vocabulary acquisition may promote more acquisition if glosses are used in place of dictionaries.

Summary

The review of incidental vocabulary acquisition and reading showed that common assessments of vocabulary acquisition were multiple-choice and VKS. It was also suggested that task involvement, type of text, frequency of word exposures, type of word used, and providing participants with glosses are variables that affect incidental vocabulary acquisition through reading. The research reviewed on incidental vocabulary acquisition through reading shows a lack of experimental research conducted among L1 middle school students using these variables.

Incidental Vocabulary Acquisition Through Writing

Hayes (2000) described writing as a cognitive process that is focused on using working memory and text interpretation. This model of writing fits well within using writing to gain incidental vocabulary acquisition. Writing can also be used to increase the involvement load of a task. Using writing for incidental vocabulary acquisition may be an effective instructional strategy because in order to succeed, the writer needs to focus on being inventive and creative; these characteristics allow writers to elaborate on their understanding of ideas, to test language, and then develop a greater learning experience (Beck, McKeown, & McCaslin, 1983; Flower & Hayes, 1981; Hulstijn & Laufer, 2001; Paribakht & Wesche, 1997).

Graham and Perin's (2007) oft-cited Writing Next Report suggested that writing allows students an opportunity to practice and use vocabulary. For example, Duin and Graves (1987) conducted an experiment with eighty middle school students, partly exploring writing instruction and its impact on vocabulary. The participants took part in one of three activities: vocabulary and writing, vocabulary-alone, and traditional vocabulary. The researchers reported no significant difference between the groups at pretest. On the posttest, there was a significant difference in vocabulary acquisition, F (2, 71) = 18.67, $p < .0001$, between the traditional group (M = 9.71, SD = 1.83) and the vocabulary and writing group (M = 12.60, SD = .65). The results suggested that the group who completed vocabulary with writing had greater incidental vocabulary gains than traditional vocabulary instruction. Although, it is difficult to say that writing has a conclusive effect on students' incidental learning of vocabulary as there has been too

little research on the topic (Graham & Perin, 2007).

Review of Incidental Vocabulary Acquisition Through Writing

The search for information on incidental vocabulary acquisition through writing yielded ten studies. However, no studies were located that investigated incidental vocabulary acquisition with middle school students. This review will evaluate and synthesize information from studies reviewed in regard to participants, design and analysis, measures used to evaluate acquisition, and factors shown to affect incidental vocabulary acquisition through writing.

Participants. Study participants were analyzed in regard to grade level, native language, and sample size. Of the 10 studies reviewed, eight were conducted with post-secondary students (Beal, 2007; Folse, 2006; Haratmeh, 2012; Hulstijn & Laufer, 2001; Kim, 2008; Laufer, 2003; Llach, 2009; Pichette, De Serres, & Lafontaine, 2012). The remaining two were conducted with fifth-grade students (de Leeuw et al., 2014; Marmol & Sanchez-Lafuente, 2013). None of the studies used participants in middle school, again showing a need for research among middle school students. In regards to the native language spoken by participants in the study, only one of the 10 studies was conducted with L1 participants (de Leeuw et al., 2014). Table 7 presents an overview of the studies by grade level and language. With such limited research on incidental vocabulary acquisition through writing, this review of literature has shown there is a need for research conducted with L1 middle school participants and incidental vocabulary acquisition through writing.

The 10 studies reviewed were quantitative studies. Because of the nature of quantitative studies, the sample sizes are relatively larger than when qualitative studies are included. The study with the largest sample size involved 225 participants (Hulstijn & Laufer, 2001); the smallest study had 27 participants (Llach, 2009). Descriptive statistics for the sample sizes from the ten studies are shown on Table 8.

The range of participants varied based on the sampling procedure. Two studies used one intact class of students (Llach, 2009; Marmol & Sanchez-Lafuente, 2013). Six

Table 7

Analysis of Participants of Incidental Vocabulary Acquisition and Writing Research

Grade level	L1	L2
Post-secondary	0	8
High school	0	0
Middle school	0	0
Elementary	1	1

Table 8

Sample Size Descriptive Statistics for Incidental Vocabulary Acquisition and Writing

Descriptive statistic	All	MS	All L1	All L2	MS L1	MS L2
M	118.70	N/A	149	115.33	N/A	N/A
Median	133.50	N/A	N/A	118	N/A	N/A
SD	70.92	N/A	N/A	74.37	N/A	N/A
Range	27-225	N/A	N/A	27-225	N/A	N/A
Number of articles	10	0	1	35	N/A	N/A

studies used several intact classes (Beal, 2007; de Leeuw et al., 2014; Haratmeh, 2012; Hulstijn & Laufer, 2001; Kim, 2008; Laufer, 2003). One study used participants from more than one institution (Folse, 2006). Finally, one study used participants at the same institution, but not part of intact classes (Pichette et al., 2012). These statistics on sample size help to show that using intact classes has been a proven method for gathering participants. It is important to again note that no studies were located with L1 middle school participants.

Design and analysis. Four of the studies reviewed for incidental vocabulary acquisition through writing used a random assignment of participants as the controlling factor of the design. An overview of the research design and analysis for the ten studies of incidental vocabulary acquisition through writing is presented in Table 9.

Table 9

Research Design and Analysis of Incidental Vocabulary Acquisition and Writing

Characteristics of reviewed research	Total	L2	L1	MS	MS L1
Design type					
Experimental	10	9	1	0	0
Control strategy					
Pretest-posttest	3	2	1	0	0
Within-subject	3	3	0	0	0
Type of analysis					
Independent *t* test	1	1	0	0	0
ANOVA	6	6	0	0	0
Repeated measures ANOVA	4	3	1	0	0

Note: Some studies used L1 and L2.

The information gathered from these studies highlight that there were no experimental studies located which were conducted with middle school students and only one study was conducted with L1 students.

Measures of vocabulary acquisition through writing. The studies reviewed on incidental vocabulary acquisition through writing relied on two main measurements: VKS and having participants define the target words. Table 10 contains the measures used according to language and grade level.

Four studies used VKS as a way to measure vocabulary acquisition (Beal, 2007; Folse, 2007; Kim, 2008, Marmol & Sanchez-Lafuente, 2013) and another four studies had participants define the target words as a to measure vocabulary acquisition (Hulstijn & Laufer, 2001; Laufer, 2003; Llach, 2009; Pichette et al., 2012). Similar to the review of incidental vocabulary acquisition and reading, this review shows that the VKS is frequently used to measure incidental vocabulary acquisition.

Factors Shown to Affect Incidental Vocabulary Acquisition through Writing

The research studies located presented three main factors that impact incidental

Table 10

Measures Used to Assess Incidental Vocabulary Acquisition through Writing

Measure used	Total	L2	L1	MS	L1 MS
Vocabulary Knowledge Scale	4	4	0	0	0
Define target words	4	4	0	0	0
Interview	2	1	1	0	0
Translate target words	1	1	0	0	0
Checklist (yes if familiar, no if not)	1	1	0	0	0

Note.: Some studies used more than one measure.

vocabulary acquisition through writing: sentence writing, gap-fill, and extended writing.

Sentence writing. In a study conducted by Laufer (2003), 60 L2 post-secondary students either read a glossed text, or wrote original sentences using ten target words. After completing a vocabulary assessment, a *t* test was used to compare the two groups. It was found that the sentence writing group (M = 6.89, SD = 1.82) significantly outperformed the reading group (M = 1.93, SD = 2.1). In a between-subject design, Llach (2008) had 27 L2 post-secondary students, (1) read a text and answer three comprehension questions, (2) read a glossed text and answer ten reading comprehension questions, or (3) read a list of the target words and then write original sentences with each word. The results of a translation assessment showed that the group who wrote original sentences (M = 3.61, no SD reported) received higher scores than the group who read a glossed text (M = 1.27, no SD reported) and the group who read a text and answered comprehension questions (M = .66, no SD reported). In another study, Marmol and Sanchez-Lafuente (2013) asked 28 L2 fifth-grade participants to write sentences; instead of having the target words glossed, students were provided dictionaries to find the meaning of the target words. While the researchers found that both tasks had a positive effect on incidental vocabulary acquisition, $F(3, 27) = 27.59$, $p < .01$, the participants who wrote sentences using glosses outperformed participants who used dictionaries. A variation of the sentence-writing task was used by Pichette et al. (2012). The researchers had 203 L2 university students either read a target word in three sentences or write three original sentences per target word. The results of the study show a statistically significant difference between the tasks, with the writing sentence group outperforming the reading

group, $F(1, 202) = 47.28$, $p < .01$. Much of the research conducted on incidental vocabulary acquisition through writing sentences suggests a positive impact on incidental vocabulary acquisition. The research also suggests that for L2 students, sentence writing has a greater impact on incidental vocabulary acquisition than reading, possibly because writing usually has a higher involvement load than reading.

Gap-fill. Gap-fill is another writing method used by researchers to increase incidental vocabulary acquisition. Gap-fill requires that a text have target words removed and replaced with blanks. Participants are then required to write the correct target word in the blanks of the text. In a study that found gap-fill to have a positive impact on incidental vocabulary acquisition, Kim (2008) had 64 L2 post-secondary participants read an informational text that contained 575 words. Ten target words were removed and were listed on a separate sheet of paper in a random order. The results of this study found that the participants who completed the gap-fill activity had significantly greater incidental vocabulary acquisition than the participants who completed the reading task without a gap-fill activity, $F(2, 58) = 68.17$, $p < .05$.

Folse (2006) took a slightly different approach and presented participants with unrelated sentences that had one target word removed and replaced with a blank. Target words were also available, along with distractors at the top of the page. One group of participants completed the gap-fill once, the other group completed gap-fill three times per word. The results found that the group who completed the gap-fill ask three times, had significantly greater vocabulary acquisition than the group who completed gap-fill one time and the group who wrote sentences, $F(2, 306) = 87.01$, $p < .01$. The results from

the studies reviewed on incidental vocabulary acquisition through writing show that there is some promise for using gap-fill as a writing strategy for incidental vocabulary acquisition.

Extended writing. Writing more than just single sentences was a task used to facilitate incidental vocabulary acquisition through writing. Hulstijn and Laufer (2001) had 60 L2 post-secondary participants complete a letter to the editor as the extended writing activity. They found there was a significant difference between the reading only, gap-fill, and composition groups, $F(2, 84) = 11.50$, $p < .01$; the composition group had significantly greater scores on the vocabulary assessment. In a study conducted by Laufer (2003), participants completed a reading with a glossed text or an extended writing activity. The results showed that the participants who completed extended writing task had significantly greater ($p < .01$) vocabulary acquisition ($M = 6.89$, $SD = 1.82$) than the reading group ($M = 1.79$, $SD = 2.1$). In a study conducted by de Leeuw et al. (2014), participants were asked to write a summary that contained target words. The results showed differences between tasks, $F(1,131) = 7.53$, $p < .01$, with the summary-writing group achieving higher incidental vocabulary gains than the control ($p < .05$). The results of the studies that used extended writing to impact incidental vocabulary acquisition showed a positive impact on vocabulary acquisition, possibly because extended writing requires more involvement in a task.

Summary

The review on the impact of writing on incidental vocabulary acquisition showed that writing typically has a positive impact on incidental vocabulary acquisition.

Specifically, the research suggested that having participants complete sentence writing, gap-fill, and extended writing activities can lead to an increase of incidental vocabulary acquisition (de Leeuw et al., 2014; Hulstijn & Laufer, 2001; Laufer, 2003). However, few studies have explored incidental vocabulary acquisition through sentence writing or extended writing tasks; this review of literature has revealed the need for more research in this area, especially among L1 middle school students.

Incidental Vocabulary Acquisition Through Reading *and* Writing

Reading and writing have both been suggested to have a positive impact on incidental vocabulary acquisition, as has been previously discussed. Typically, in a classroom, reading and writing are taught as two separate skills (Fitzgerald & Shanahan, 2000). However, researchers have found that learning tasks that combine reading and writing can lead to more retention of knowledge (Shanahan, 1990, 1997, 1998; Stahl & Fairbanks, 1986). This has been demonstrated in research where participants who completed a reading task combined with some form of elaboration, outperformed participants who completed a reading only task (Cho & Krashen, 1994; Hulstijn & Laufer, 2001; Llach, 2009; Paribakht & Wesche, 1997; Zimmerman, 1997). Bangert-Drowns, Hurley, and Wilkinson (2004) and Wesche and Paribakht (2000) suggested that a reason that a multifaceted approach using reading and another elaborative feature, such as writing, can result in greater vocabulary acquisition is because it can promote students' desire to learn more about unknown words, provide multiple exposures to the unknown words, and allow them to elaborate. This effectively strengthens the learner's knowledge

of the word. Although research reviewed supports an approach that combines reading and writing to facilitate more incidental vocabulary acquisition (Lu, 2013; Paribakht & Wesche, 1997; Rott, 1999), there have been relatively few, if any, studies that have examined incidental vocabulary acquisition through reading *and* writing, in general, and none using L1 middle school participants.

Review of Incidental Vocabulary Acquisition Through Reading *and* Writing

The search yielded one study, which used a reading *and* writing task for incidental vocabulary acquisition, conducted by Yaqubi, Rayati, and Gorgi (2010). The researchers randomly assigned six intact classes with 69 L2 post-secondary students in two all-girl schools to complete one of three tasks. The first task of the quasi-experimental study was, with the use of dictionary, to read an informational text, which included bolded target words. Participants then had to answer five multiple-choice reading comprehension questions. The second task had participants read the same text as the first task; however, the target words were removed from the text. Participants then completed a gap-fill task with the 10 target words. The third task required participants to read the same, which included the bolded target words. Participants then had to use the target words to write a one to three paragraph response explaining their feelings about the incident in the informational text. Using Independent *t* tests to compare groups, the results of the study showed that the group who completed the reading *and* writing task (M = 7.6, SD = .94) had significantly higher incidental vocabulary acquisition scores than the group who completed the gap-fill task (M = 6.7, SD = 1.49) or the group who completed the reading

task (*M* = 4.16, *SD* = 1.69). The researchers suggested that the reason the reading *and* writing task was greater than the other two tasks for vocabulary acquisition is because the reading *and* writing task required a higher involvement load in order to complete the task. The results of this study are congruent with other research conducted by Shanahan (1990, 1997, 1998) and Stahl and Fairbanks (1986), which stated reading *and* writing could lead to better learning. The results of this study also agree with the studies by Hulstijn and Laufer (2001) and Laufer (2003) that suggested a higher involvement load will lead to more incidental vocabulary acquisition.

Although this study is intriguing, it has several weaknesses. For example, the participants were L2 post-secondary students who were from all-female schools. The research questions and discussion did not address the narrow sample of the study, and results were described in a generalizable way. Furthermore, the researchers acknowledged the initial number of participants was too small for the study (about 10 per task). The researchers tried to remedy the problem by adding participants from another all-female school. The final sample size of sixty-nine students in six classes still resulted in a small unit of analysis sample. Another area of weakness in this study was even though a reading *and* writing task was used (Task 3) the effectiveness of the reading *and* writing task on incidental vocabulary acquisition was not measured or analyzed. Additionally, the method of data analysis was another weakness in the study; multiple independent *t* tests were conducted to compare the tasks. One was conducted to compare Task 1 to 2 (to measure the effectiveness of differing task involvement loads) and one was conducted to compare Task 1 to 3 (to measure input task vs. output task).

Furthermore, the questions of the research study could have been answered by using a stronger analysis tool such as an ANOVA with a post hoc test or a regression model to determine differences among the tasks. Finally, because each participant did not complete all three tasks, individual differences among the participants could have affected the outcomes of the study. A within-subject design would strengthen an analysis of incidental vocabulary acquisition by adding power to the study and reducing the error variance that is associated with the participants' differences. While Yaqubi et al. (2010) conducted a study using the ILH, which included a reading *and* writing variable, the limitations of the study design and analysis leaves a strong gap for research that focuses on the effectiveness of incidental vocabulary acquisition through reading *and* writing.

Conclusion

Reading has been considered essential for incidental vocabulary acquisition because as learners encounter unknown words in a text, there are, ideally, many known words surrounding the unknown word, helping the learner to make sense of the word (Graves, 2006; Nagy, Anderson, & Herman, 1987; Nagy & Scott, 2000). However, reading alone may not be the most effective strategy to increase incidental vocabulary acquisition (Laufer, 2003). Writing has been shown to positively impact incidental vocabulary acquisition, especially through the use of sentence writing and extended writing activities (de Leeuw et al., 2014; Hulstijn & Laufer, 2001; Laufer, 2003). But, there have been relatively few studies that have explored the impact of writing on incidental vocabulary acquisition. Based on the research reviewed, a multifaceted approach, such as reading *and* writing, should be a superior task than reading or writing

alone. However, research exploring the effectiveness of incidental vocabulary through reading *and* writing has been scarce, especially among L1 middle school participants.

CHAPTER III

METHODS AND PROCEDURES

Researchers of vocabulary acquisition agree that the majority of vocabulary is acquired incidentally (Eckerth & Tavakoli, 2012; Hill & Laufer, 2003; Huckin & Coady, 1999; Hulstijn, 2003; Rott, 2011). However, research on incidental vocabulary acquisition for middle school students has been relatively disregarded (Beck et al., 2002; Blachowicz, 1986; Blachowicz & Fisher, 2000; Graves, 2009; Kelley et al., 2010; Read, 2000). Therefore, the purpose of this study is to explore the relative effectiveness of three conditions for incidental vocabulary acquisition of new vocabulary with L1 middle school students. The following questions were used to guide the current study.

1. For L1 eighth-grade students, does the instructional condition (reading, writing, reading *and* writing) affect initial incidental vocabulary acquisition gains?
2. For L1 eighth-grade students, are there significant differences in incidental vocabulary retention rates based on instructional condition (reading, writing, and reading *and* writing)?
3. For L1 eighth-grade students, what is the relationship between the students' overall vocabulary size, reading proficiency, and incidental vocabulary gains?

Hypotheses

The null hypothesis suggests that there will be no significant difference ($p < .05$) in incidental vocabulary gains among the three instructional conditions: reading, writing, and reading *and* writing among L1 eighth-grade middle school students. However, consideration of the Involvement Load Hypothesis would suggest that participants who complete a task with a higher involvement load would have greater incidental vocabulary

acquisition gains (Haratmeh, 2012; Huang et al., 2012; Hulstijn & Laufer, 2001; Keating, 2008). Involvement load is measured based on three components: *need*, *search*, and *evaluation*. *Need* is the motivation behind a task and can have a score of 0 (none), 1 (moderate), or 2 (strong). *Search* is how learners use a tool to discover the meaning of unknown words and can have a score of either 0 (absent) or 1 (present). *Evaluation* is how learners make decisions of how to use an unknown word and can have a score of 0 (none), 1 (moderate), or 2 (strong). Additionally, Block, Hancock, and Zakay (2010) stated that when a learner is required to change how they are processing information—such as moving from a low load task (reading) to one with a higher load (writing)—it increases the involvement load of a task. Therefore, for this study, a change of processing component was added to the overall involvement score with a possible score of 0 (absent) or 1 (present). The scores from the four components were then summed to create an overall involvement score. A task could have a possible involvement load score ranging from 0-6, as shown on Table 11 (Block et al., 2010; Hulstijn & Laufer, 2001; Marmol & Sanchez-Lafuente, 2013).

The involvement scores of the three conditions in this study vary. The reading condition has an involvement score of 1 (need = 1, search, = 0, evaluation = 0, change of processing = 0). The writing condition has an involvement score of 3 (need = 1, search = 0, evaluation = 2, change of processing = 0). The reading and writing condition has an involvement score of 4 (need = 1, search = 0, evaluation = 2, change of processing = 1). Because of the differences of involvement load of each task, the following results are expected from this study.

Table 11

Possible Involvement Load Scores

Involvement score	Need	Search	Evaluation	Change of processing
0	None: There is no need to learn the unknown word.	Absent: There is no effort to find or understand meaning of unknown words. Definitions are explicitly given.	None: There is no comparison of words with others to determine whether the unknown word fits within the context given or if the correct version is being used.	Absent: The task does not require a change of processing.
1	Moderate: Learning of unknown words is motivated by an outside force (assignment, teacher, etc.)	Present: An effort is made to find the meaning of the unknown words from a dictionary or other source.	Moderate: There is recognition in the differences between unknown words and a choice is made of best fit from the list of unknown words.	Present: The task requires a change of processing.
2	Strong: Learning of unknown words is motivated from within the learner.	N/A	Strong: There is recognition in the differences between unknown words and a decision of how unknown words can combine with the known words.	N/A

Question 1: For L1 eighth-grade students, does the instructional condition (reading, writing, reading *and* writing) affect initial incidental vocabulary acquisition gains? The null hypothesis for this question is that on immediate assessments there will be no difference between the three instructional conditions of reading, writing, and reading *and* writing. Therefore, if there is a difference, it supports the modified ILH theory as used in this study and the inclusion of reading *and* writing for L1 8 eighth-grade students.

Question 2: For L1 eighth-grade students are there significant differences in

incidental vocabulary retention based on instructional condition (reading, writing, and reading *and* writing)? The null hypothesis for this question is that on delayed assessments there will be no difference between the three instructional conditions of reading, writing, and reading *and* writing. Therefore, if there is a difference, it will also support the modified ILH theory as used in this study and further support the inclusion of reading *and* writing for L1 eighth-grade students.

Question 3: For L1 eighth-grade students, what is the relationship between students' overall vocabulary size, reading proficiency, and incidental vocabulary gains? The null hypothesis for this question is that vocabulary size and reading proficiency will not have a significant relationship with student incidental vocabulary gains. Therefore, this question helps to increase understanding of how students' vocabulary size and reading proficiency influence incidental vocabulary acquisition for L1 eighth-grade students.

Setting and Participants

This study took place in a school district in the Intermountain West region, classified as a large suburban district (National Center for Education Statistics [NCES], n.d.). The school district includes 81 schools (11 high schools, 11 junior high schools, and 51 elementary schools), with a total student population of 73, 975 (NCES, n.d.). The junior high school selected for this study is classified as a small city school (NCES, n.d.). This school was selected due to convenience of proximity to the researcher. The total student population of the school is 1,205. Twenty-nine percent of the school's population

has a minority classification: 23% Hispanic, 3% Asian/Pacific Islander, 3% other (Utah State Office of Education [USOE], n.d.). The selected school has a higher minority percentage than the district (16.4% minority), a similar percentage to the state (24.5%), and a lower minority percentage than the national average (32.4%) where the school is located (NCES, n.d.; USOE, n.d.). Forty-one percent of students are eligible for free or reduced lunch (USOE, n.d.), which is a higher percentage than the district (26.4%), similar to the state average (40.4%), and lower than the national average (51.3%) where the school is located (NCES, n.d.; USOE, n.d.). Within this school, there were 332 eighth-grade students, when the current study was conducted. There are two eighth-grade English teachers at the school; both teachers participated in this study.

A power analysis was conducted using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). Most of the reviewed studies did not discuss effect size; therefore, a power analysis was conducted with an estimated small effect size and a medium effect size to provide a possible range of needed participants. With a 95% confidence level, 264 students would be necessary for a small effect size; forty-five students would be necessary for a medium effect size. However, to increase generalizability, all eighth grade students in the selected school were invited to participate in this study. Students with informed consent completed each of the tasks for the three instructional conditions. As the purpose of this study was to examine the incidental vocabulary acquisition of L1 students, students who were classified as L2 were excluded from the data analysis. Furthermore, in order to ensure that students had sufficient mastery of reading and writing skills to complete the necessary tasks, and to preclude the possibility that working

memory saturation would prevent vocabulary acquisition (Pichette et al., 2012), only students who did not require special education accommodations in reading were included in the data analysis. These students, as well as students without informed consent participated in a literacy-based activity in the classroom; they were not penalized for non-participation. The total number of participants in this study was 263 eighth grade students. One hundred thirty-five of the participants were male and 128 were female. Table 12 presents the demographics of participants in this study.

Research Design

An experimental within-subject design was used in this study. An advantage to using a within-subject design was that each participant acted as his or her own control. This helped to reduce the error variance that can arise from individuals and their differences, while also increasing the overall power of the study (Seltman, 2015). To examine how L1 eighth-grade participants incidentally acquire vocabulary through reading, writing, and reading *and* writing, students completed three instructional condition tasks, each with a different level of involvement load. According to ILH, the

Table 12

Demographics of Study Participants

Demographic	Number
Study participants	263
Male participants	135
Female participants	128

level of involvement can impact the amount of incidental vocabulary acquisition (Hulstijn & Laufer, 2001).

Instructional Condition Task: Reading

For the reading instructional condition, participants completed a reading of a narrative text with eight pseudowords targeted for incidental vocabulary acquisition. The pseudowords were purposely distributed throughout the passage. The pseudowords were bolded and the meanings of the pseudowords were provided (glossed) to mimic the format typically used in middle school anthologies. The use of bold font and glosses to enhance text has been shown to encourage participants to attend to the elaborated words (Folse, 2006; Laufer, 2003). A one-word meaning (a noun) was provided in the text margins for the pseudowords. These one-word meanings were the words that were removed from the text and replaced by pseudowords (e.g., in the text, *Riley and Leonard* the noun "classmate" was replaced with the pseudoword "zerm"). As the amount of exposures can have an impact on acquisition, each pseudoword appeared bolded in the text twice. On the first appearance of a pseudoword, the meaning of the word was included in the right hand side margin. On the second appearance, the pseudoword was bolded, but the meaning was not included again. The task had a range of approximately 5-20 minutes to complete.

This reading condition had an involvement load score of 1. This score was given because students are required to complete the assignment containing the unknown words (*Need* = 1). Participants were provided a gloss with the meaning of the unknown words (*Search* = 0). The task did not require students to compare words or make a determination

of whether the word is being used correctly in context (*Evaluation* = 0). There was no change of processing for this task (*Change* of *Processing* = 0).

Instructional Condition Task: Writing

For the writing instructional condition, participants completed the task of writing sentences for the eight pseudowords assigned to this condition. Participants were given a list of eight pseudowords, the part of speech (noun), and the definitions of the words. The task required participants to write two complete sentences for each of the eight pseudowords. This writing task also reflected authenticity of classroom instruction as original sentence writing is one of the most commonly used written vocabulary tasks (Folse, 2006). Similar to the reading condition, simple language was used for the definitions and accuracy was reviewed by the researcher, middle school teachers, and experts in literacy. The task had a range of approximately 10-30 minutes to complete. An example of the writing task is shown in Figure 4.

The writing only condition had an involvement load score of 3. This score was given because participants were required to complete the assignment containing the unknown words (*Need* = 1) and were provided a gloss that explicitly gave the definitions of unknown words (*Search* = 0). Participants had to make a decision on how unknown words can combine with the known words in order to make a coherent sentence (*Evaluation* = 2). There was no change of processing in this task (*Change of Processing* = 0).

Read each noun the *noun* and the definition given in the boxes below. Then, use the noun and a verb to write two complete sentences. Make sure each sentence provides clues to the meaning of the noun.

Noun # 1	Definition
nilb	home

Sentence 1: _____

_____

_____

Sentence 2: _____

_____

_____

Figure 4. An example of the writing condition sentence task.

Instructional Condition Task:
Reading *and* Writing

For the reading *and* writing instructional condition, participants completed the task of reading a narrative text and writing a summary of the text. For the reading portion of this condition, participants followed the same procedures as in the reading condition, in regards to the type of text, how the target words are placed in the text, and the creation and review of the definitions. The second component of the reading *and* writing condition required participants to write a summary of the text they read. The summary task required participants to use the bolded words that appeared in the reading portion of the task. In order to complete this task, participants retained the text until they completed the summary (de Leeuw et al., 2014). This task had a range of approximately 10-35 minutes to complete.

Reading and writing was considered to have an involvement score of 4. This score

was given because students were required to complete the assignment containing the unknown words (*Need* = 1) and were provided a gloss to find the meaning of the unknown words (*Search* = 0). Participants had to make a decision on how unknown words can combine with the known words to make sense (*Evaluation* = 2). This task required students to change processing from reading to writing (*Change of Processing* = 1). The involvement load scores for the conditions in this study are shown in Table 13.

Texts

To minimize the variances in the study due to the texts, text selection was carefully considered in regard to text type, reading level, and length. Fictional narrative texts were used in this study to control for potential differences in prior subject knowledge of participants; the more a student knows about a topic, the greater the comprehension of the topic. This lessens the students' need to focus on vocabulary used within the text (Stahl, Hare, Sinatra, & Gregory, 1991; Stahl & Jacobson, 1986; Stahl, Jacobson, Davis, & Davis, 1989). Furthermore, research has suggested that fictional texts

Table 13

Involvement Load Scores for this Study

		Involvement load				
Condition	Description	Need	Search	Evaluation	Change of processing	Total
Reading	Reading comprehension with glosses	1	0	0	0	1
Writing	Writing sentences with help of glosses	1	0	2	0	3
Reading & writing	Reading comprehension with glosses and writing a summary	1	0	2	1	4

are more likely to contain at least 95% familiar words, which is necessary for incidental vocabulary acquisition while reading (Ehsanzadeh, 2012; Gardner, 2004; Pulido, 2003, 2007).

For the purposes of this study, text choices were limited to eighth-grade literary fiction passages with a Lexile score of 900L or lower. Lexile scores are used to measure the complexity of the semantic and syntactic features of a text (Lexile Framework for Reading, n.d.). Lexile scores can range from 100L-1500L, with the higher the number, the more complex the text. A typical Lexile range for eighth-grade texts would fall between 805L and 1100L (Lexile Framework for Reading, n.d.). This choice to limit the search to texts below 900L was because the focus of this study was incidental vocabulary acquisition; the texts selected would have to allow the reader to read at the lower band of the Lexile rating, in order to help avoid potential use of frustrational level text, which can inhibit learning (Nagy et al., 1987).

The length of text was taken into consideration, as the text needs to be short enough to allow participants to complete the reading and associated measure in the time allotted. Additionally, the text had to contain enough words to ensure that with the addition of pseudowords, 95% of the text contains familiar words to facilitate incidental vocabulary acquisition (Ehsanzadeh, 2012; Gardner, 2004; Pulido, 2003, 2007).

The two eighth-grade fictional narrative reading passages of The Flynt Cooter Comprehensive Reading Inventory-2 (Cooter, Flynt, & Cooter, 2014) were used for this study. These two narrative passages met the requirements of this study for text type, difficulty level, and length. Additionally, these two passages have been identified as

equivalent test-retest forms (Cooter et al., 2014). To further control for text effects, each text was used in both the conditions that required reading and were counterbalanced across participants. Each text had a version for the reading only condition, which included the pseudowords in that text to appear twice. There was also a version for the reading *and* writing condition in which pseudowords appeared once, as the second exposure would come during the writing task.

Text 1: Riley and Leonard. The passage is about Leonard, who was not popular in school and was bullied by Riley, another student. As they grew older, Leonard is quite successful, but Riley is not. One day, Leonard gave a homeless man some money. The homeless man becomes so excited that he steps into the street, is hit by a car, and dies. The next day, when Leonard reads the newspaper he learns the man was Riley. This story contains 430 words with a Lexile level of 840.

Text 2: The eagle. This passage is about a boy and his father who find an eagle egg while on a hike in the mountains. They bring the egg back to their farm and raise it with their chickens. The eagle adopts the habits of the chickens. One day, a man comes by and tells the farmer that the bird is not a chicken, but an eagle. He tries to prove it by having the eagle fly. This story contains 491 words with a Lexile level of 820.

Pseudowords

To help control for variances in participants' prior knowledge and exposure to the words, pseudowords were used in each of the three instructional conditions of this study. Brown et al. (2008) stated:

Words being symbols of meanings, a change in symbol (its spelling), provided it

> conforms to normal spelling and collocational conventions, has both construct and face validity as it represents the matching of a new form for a given concept (i.e., learning a word in the traditional sense). (p. 141)

The use of pseudowords had been recommended as that it ensured there was no prior knowledge of the words being used in the study and it was difficult to find words that participants had not encountered before (Webb, 2007). The use of pseudowords eliminated the need of a pretest to measure prior knowledge of the words (Hulstijn, 2003; Keating, 2008; Pichette et al., Webb, 2007). This was advantageous, as a pretest could have possibly given clues to the participants that the focus of the study was on vocabulary, which would change the task from incidental to intentional (Webb, 2007). Finally, use of pseudowords was advantageous to ensure that participants were not be exposed to the words outside of the study, which would have affected the results of the delayed posttests (Waring & Takaki, 2003).

The type of word used has been shown to affect the difficulty of learning a word (Baker, 1989; Folse, 2006). In this study, the pseudowords replaced nouns, as nouns have been shown to be more advantageous for learning new words (Kweon & Kim, 2008; McLeod & McDade, 2011). In addition, using one part of speech increased the similarity of words and strengthened the comparison of the three instructional conditions for incidental vocabulary acquisition (Folse, 2006).

The length of word also has an impact on the acquisition of unknown vocabulary words. Baker (1989) determined that word acquisition failures were more likely to occur with longer words than with shorter words. To control for the length of the word impacting incidental vocabulary acquisition, the pseudowords in this study had 1-2

syllables.

The number of exposures to unknown words can affect the success of learning them (Laflamme, 1997; Nagy et al., 1985; Nation, 2005; Pellicer-Sanchez & Schmitt, 2010; Rott, 1999; Stahl & Fairbanks, 1987). To control for number of exposures, participants were exposed to each pseudoword twice. In the reading condition, each pseudoword appeared twice in the text. In the writing condition, participants were required to write each pseudoword twice. In the reading *and* writing condition, the pseudowords appeared once in the reading, and participants were required to write each pseudoword once, which resulted in the two exposures to the pseudowords. Thus, the number of exposures was equivalent in the three conditions.

A total of 24 pseudowords were used in this study. This number of target words was chosen as too few words would create difficulty in showing variance between conditions on the assessment. Too many target words could have negatively affected the amount of incidental vocabulary acquisition gains for participants; it has been shown that readers should be familiar with approximately 95% of words in the passage for successful incidental vocabulary acquisition (Ehsanzadeh, 2012; Gardner, 2004; Pulido, 2003, 2007). Furthermore, the number of target words was similar to the amount used in previous studies on incidental vocabulary acquisition reviewed for this study (M = 27.28, SD = 21.79).

Creating the pseudowords. When creating the list of pseudowords for this study, pseudoword lists from previous research were reviewed. For this study, the following factors were necessary for the pseudowords: number of syllables, number of letters per

syllable, match of phonological and orthographical patterns based on the six most common syllable patterns (Moats, 1995), initial letter randomly distributed, and a confirmation of the pseudowords as having no previous meaning in traditional dictionaries and urban dictionaries. In review of pseudoword lists in previous research, it was found that the word lists did not meet these criteria. Because the previous word lists were insufficient, a new list of pseudowords were created for this study. The pseudowords for this study were first formed by exchanging the vowels and consonant of real words. Next, all words were cross-referenced with Merriam-Webster's dictionary (2016) and Urban Dictionary (n.d.) to ensure they were not already recognized words with a known meaning. If words were found to have a meaning, then more exchanges were made to create a different pseudoword.

Once the pseudowords on the word list were reviewed and found to have no known meaning or usage, the list was confirmed as actual pseudowords. Next, the distribution of structure of each word was examined to ensure equal distribution among all conditions. Each word was checked for number of syllables, the number of letters in each word, the vowel and consonant sounds, and the beginning and ending letters. Changes were made where necessary. This was done to control for word structure influencing the outcomes of the study. The distribution of word structures is provided in Table 14. Finally, words were checked to ensure similar distribution of beginning and ending consonants among the words in each condition as well as vowel patterns; changes were made to the word list where necessary. The distribution of consonants is provided in Table 15. The distribution of vowel patterns is provided in Table 16. After the

Table 14

Structure of Pseudowords

List 1	List 2	List 3	Structure
juzy	nilb	vosp	1 syllable, 4 letters, varied beginning and ending letters
zerm	sirk	qurf	1 syllable, 4 letters, r-controlled vowel with the "ER" sound, varied beginning and ending letters
gole	vake	zide	1 syllable, 4 letters, vowel-silent *e*, varied beginning and consonant + *e* letters
bour	tead	rait	1 syllable, 4 letters, various vowel teams (digraphs), varied beginning and ending letters
cowex	qurig	lutak	2 syllable, 5 letters, varied beginning and ending letters
subdal	hantic	jarboh	2 syllables, 6 letters, each syllable three letters, varied beginning and endings
putgon	fandex	wopkey	2 syllables, 6 letters, closed syllables, varied beginning, middle, and ending consonants
wuddle	diggle	mepple	2 syllables, 6 letters, each syllable 3 letters, closed first syllable, le ending pattern, varied double middle letters

Table 15

Distribution of Consonant Letters in Pseudowords

	List 1		List 2		List 3		Total		
Consonant	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Grand Total
B	1	0	0	1	0	0	1	1	2
C	1	0	0	1	0	0	1	1	2
D	0	0	1	1	0	0	1	1	2
F	0	0	1	0	0	1	1	1	2
G	1	0	0	1	0	0	1	1	2
H	0	0	1	0	0	1	1	1	2
J	1	0	0	0	1	0	2	0	2
K	0	0	0	1	0	1	0	2	2
L	0	1	0	0	1	0	1	1	2
M	0	1	0	0	1	0	1	1	2
N	0	1	1	0	0	0	1	1	2
P	1	0	0	0	0	1	1	1	2
Q	0	0	1	0	1	0	2	0	2
R	0	1	0	0	1	0	1	1	2
S	1	0	1	0	0	0	2	0	2
T	0	0	1	0	0	1	1	1	2
V	0	0	1	0	1	0	2	0	2
W	1	0	0	0	1	0	2	0	2
X	0	1	0	1	0	0	0	2	2
Y	0	1	0	0	0	1	0	2	2
Z	1	0	0	0	1	0	2	0	2

Table 16

Distribution of Vowel Patterns in Pseudowords

Word	A	E	I	O	U	R-control	Digraph	C + Le
bour	0	0	0	0	0	0	1	0
cowex	0	1	0	1	0	0	0	0
diggle	0	0	1	0	0	0	0	1
fandex	1	1	0	0	0	0	0	0
gole	0	0	0	1	0	0	0	0
hantic	1	0	1	0	0	0	0	0
jarboh	0	0	0	1	0	1	0	0
juzy	0	0	0	0	1	0	0	0
lutak	1	0	0	0	1	0	0	0
mepple	0	1	0	0	0	0	0	1
nilb	0	0	1	0	0	0	0	0
putgon	0	0	0	1	1	0	0	0
qurf	0	0	0	0	0	1	0	0
qurig	0	0	1	0	0	1	0	0
rait	0	0	0	0	0	0	1	0
sirk	0	0	0	0	0	1	0	0
subdal	1	0	0	0	1	0	0	0
tead	0	0	0	0	0	0	1	0
vake	1	0	0	0	0	0	0	0
vosp	0	0	0	1	0	0	0	0
wopkey	0	1	0	1	0	0	0	0
wuddle	0	0	0	0	1	0	0	1
zerm	0	0	0	0	0	1	0	0
zide	0	0	1	0	0	0	0	0
TOTAL	5	4	5	6	5	5	3	3

pseudowords were created and checked as described, they were split into three groups of eight words, similar to previous research conducted (Hemmati & Asmawr, 2015; Waring & Takaki, 2003; Webb, 2007); a differing group of eight words were used in each of the three instructional conditions (Table 17).

Table 17

List of Pseudowords and Context

List 1: Riley and Leonard	List 2: Writing	List 3: The Eagle
juzy	nilb	vosp
zerm	sirk	qurf
gole	vake	zide
bour	tead	rait
cowex	qurig	lutak
subdal	hantic	jarboh
putgon	fandex	wopkey
wuddle	diggle	mepple

The stories used in the instructional conditions that required reading were analyzed to determine which words would be replaced by the pseudowords. The analysis included where the word was placed in the story to ensure an even distribution of pseudowords throughout the story. Additionally, all words that were chosen were nouns. The pseudowords and the words they replaced is shown in Table 18.

It is common practice to debrief participants on the pseudowords after the study has been completed (Keating, 2008). Therefore, at the conclusion of this study, participants were made aware that the words used in the conditions were pseudowords. Participants and their parents were provided with a written debriefing that included the justification for using pseudowords, as well as the list of the pseudowords and the real words they replaced. There were no concerns raised by participants or parents about the use of pseudowords in this study.

Table 18

Pseudowords and Real Word Replacement

Pseudoword	Real word
bour	food
cowex	teasing
diggle	nest
fandex	legend
gole	pride
hantic	book
jarboh	barn
juzy	loser
lutak	breeze
mepple	summit
nilb	home
putgon	headline
qurf	jacket
qurig	locker
rait	bluff
sirk	valley
subdal	hand
tead	restaurant
vake	beggar
vosp	trek
wopkey	area
wuddle	group
zerm	classmate
zide	feed

Outcome Measures

This study used three types of vocabulary measures commonly identified in the review of the literature as outcomes to help answer the questions of this study: word recognition tests (WRT), multiple-choice tests (MC1 & MC2), and a vocabulary knowledge scale (VKS1 & VKS2).

Word recognition tests. A WRT was an assessment that asked participants to

mark whether they recognized certain words from a list. Previous research on incidental vocabulary acquisition used WRT as an outcome measure (Doughtery-Stahl & Bravo, 2010; Rott et al., 2002; Waring & Takaki, 2003). WRT has been used to measure immediate word knowledge gain (Anderson & Freebody, 1981, 1982; Rott et al., 2002) and has been suggested to be a useful measure as it allows participants to show even small amounts of word knowledge gain (Anderson & Freebody, 1981, 1983; Waring & Takaki, 2003). Research on the validity and reliability of a WRT type assessment was reported by Anderson and Freebody. They reported results by Sims (1929) on WRT type assessments as having good reliability (Spearman-Brown split-half reliability = .92). Anderson and Freebody (1983) conducted their own analysis of WRT type assessments. They gave participants a WRT and then conducted interviews with participants. The researchers split the responses into three categories, strict (adult-like definition), moderate (a definition or used correctly in a sentence), and lenient (there was some suggested knowledge of the word). They found a high correlation (.85, .89, and .92, respectively) between the WRT and interviews, suggesting that a WRT type test is a reliable measure of vocabulary knowledge.

For each condition, the WRT word list contained the eight pseudowords participants were exposed to in the particular condition participants completed and five pseudowords that were not used in the study. Research conducted by Waring and Takaki (2003) used a WRT where 60% of the words on the test were the targeted pseudowords from the study; the remaining words were distractor pseudowords. In the current study, eight pseudowords were used in each instructional condition. Five pseudowords were

chosen as distractors to create a similar percentage (62%) of pseudowords used in the study on the WRT. Additionally, the five pseudowords not used in this study were from a pseudoword list created by Waring and Takaki (2003). An example of a WRT used in this study is provided in Figure 5.

In the current study, participants completed tasks for each instructional condition of reading, writing, and reading *and* writing. After completing the instructional condition, participants were asked to complete a WRT that was unique for each condition. Without referring back to the instructional condition task, participants examined the list of thirteen words. Then they were asked to circle the words they recognized from the text. The WRT measures took approximately 5 minutes to complete.

The scoring of the WRT measures was done by giving one point for each of the eight pseudowords correctly circled or marked. One point was also given for *not* marking any of the five distractor pseudowords. There was a total range of scores of 0-13 possible. There were 0-8 possible for correctly marking pseudowords used in the condition and 0-5

WRT

Circle the words that were in the story, *The Eagle.* Please do not refer back to the story.

mepple	yoot	lutak	wopkey
tance	qurf	vosp	crasty
zide	speat	rait	jarboh
cadle			

Figure 5. An example of a WRT.

possible for correctly *not* marking the distractor pseudowords. This was a similar scoring system used by Doughtery-Stahl and Bravo (2010).

Multiple-choice. The second type of outcome measure in this study was a multiple-choice measure**.** A multiple-choice measure was chosen because a majority of the reviewed studies on incidental vocabulary acquisition used a researcher-created multiple-choice assessment to measure vocabulary (Ajideh et al., 2013; Anderson & Freebody, 1981; Baumann et al., 2003; Brown et al., 2008; Herman et al., 1987; Joe, 1998; Neuman & Koskinen, 1992; Rott, 1999; Shu et al., 1995; Yali, 2010). Participants completed two multiple-choice measures created by the researcher. The first multiple-choice measure (MC1) was completed immediately after each of the three instructional conditions. The second multiple-choice measure (MC2) was completed two weeks after the MC1.

MC1 consisted of sixteen multiple-choice questions. The questions were unique to each instructional condition. Eight questions were vocabulary questions about the meaning of the pseudowords that participants were exposed to during the condition. The other eight questions were comprehension questions about the completed condition. The comprehension questions on the MC1 were based on the questions used in The Flynt Cooter Comprehensive Reading Inventory-2 (Cooter et al., 2014) and were included to promote the incidental nature of the study. The type of question (comprehension or vocabulary) was alternated, similar to a measure design used by Reynolds and Bai (2013). The questions on pseudoword meanings were used in the data analysis as an indicator of incidental vocabulary acquisition. MC1 took approximately 5-10 minutes to

complete.

MC2 was given to evaluate the retention of pseudoword knowledge. MC2 consisted of 24 multiple-choice questions. MC2 differed in MC1 by including questions about all of the pseudowords from the three instructional conditions in one test. None of the comprehension questions were included in MC2, as reading comprehension was not a focus of this study. There were two forms of MC2 created (Form A and Form B). The questions were inverted between Form A and Form B to help control for question order having an effect on the outcome. MC2 took approximately 10-25 minutes to complete.

Each multiple-choice question had five response alternatives: one correct answer, three distractors, and one option of "not sure" to control for guessing (Ajideh et al., 2013; Brown et al., 2008; Herman et al., 1987; Joe, 1998; Rott, 1999; Shu et al., 1995; Yali, 2010). One point was given for each correct answer and zero points were given if one of the distractors was chosen. MC1 had a range of possible scores of 0-8 for the vocabulary-related questions in each instructional condition. MC2 had a range of possible scores of 0-24.

Vocabulary knowledge scale. The third outcome measure used in this study as an indicator of incidental vocabulary acquisition was the VKS (Wesche & Paribakht, 1996). VKS is recognized as a valid, reliable measure to evaluate incidental vocabulary growth after a treatment (Doughtery-Stahl & Bravo, 2010). Wesche and Paribakht reported a moderate concurrent validity correlation (r = .48) of VKS with the Eurocentres 10K Vocabulary Size Test (EVST). Wesche and Paribakht also explored the reliability of VKS through a test-retest method given 2 weeks apart. The results of this analysis

showed a Pearson correlation score of .89, indicating that VKS is a reliable measurement of incidental vocabulary acquisition. The VKS contained a scaled list of all 24 pseudowords. For each word, there were five possible response options (an example of VKS is provided in Figure 6).

1. I don't remember having seen this word before.
2. I have seen this word before, but I don't know what it means.
3. I have seen or heard this word before and I THINK it means (synonym or definition).
4. I KNOW this word; it means:
5. I can use this word in a sentence (write a sentence).

Participants completed the VKS at two different times for this study. The first VKS (VKS1) was completed immediately after all three instructional conditions were completed. The second VKS (VKS2) was completed two weeks after VKS1. VKS took approximately 30-45 minutes to complete.

Mark the boxes next to what best describes your understanding of the given word. For numbers 3, 4, and 5 for each word, also complete the information asked for.

1. Word: ***rait***

□ 1. I don't remember having seen this word before.

□ 2. I have seen this word before, but I don't know what it means.

□ 3. I have seen or heard this word before and I THINK it means (synonym or definition):

_____

_____

□ 4. I KNOW this word, it means: _____

_____

□ 5. I can use this word in a sentence (**write a sentence; if you do question #5, please also complete question #4.)**

_____

_____

Figure 6. An example of a question on the vocabulary knowledge scale.

Scoring for the VKS was based on the scoring criteria used by previous researchers (Doughtery-Stahl & Bravo, 2010; Paribakht & Wesche, 1997; Wesche & Paribakht, 2000). There were five levels for each pseudoword; each level indicated a deeper knowledge of the pseudoword. Each pseudoword could receive a possible score of 0-5. If no levels were marked for a pseudoword, then a score of zero was assigned. The total range of possible scores for VKS was 0-120. Table 19 provides the scoring guide for the VKS.

Explanatory Variables

This study included analysis of two explanatory variables of particular importance: overall vocabulary size and reading proficiency level.

Vocabulary size test. Participants' vocabulary level was analyzed through the

Table 19

VKS Scoring Guide

Level marked	Answer Evaluation	Score earned
1	marked	1
2	marked	2
3	marked, **INCORRECT** synonym, definition, or translation	2
	marked, **CORRECT** synonym, definition, or translation	3
4	marked, **INCORRECT** synonym, definition, or translation	2
	marked, **CORRECT** synonym, definition or, translation	3
5	marked, **INCORRECT** synonym, definition, or translation	2
	marked, **CORRECT** synonym, definition, or translation, no sentence	3
	marked, **CORRECT** synonym, definition, or translation, but word is used **INCORRECTLY** in the sentence	4
	marked, **CORRECT** synonym, definition, or translation and word is used **CORRECTLY** in the sentence	5

use of the Vocabulary Size Test (VST). The VST is a 140 question, multiple-choice assessment of the receptive vocabulary size in English from the first 1000 to the fourteenth 1000-word families (Beglar, 2010; Nation, 2012). Participants were instructed to choose the best definition of each word from one of four choices: one correct choice and three distractors. VST is an effective assessment of vocabulary size because it is more demanding than assessments that use a checklist format, and the test-taker must have a deeper knowledge of the word to get the correct answer as the correct choice and the distractors have similar elements of meaning (Beglar, 2010).

Beglar (2010) evaluated the validity of the VST through "a priori hypotheses concerning the latent variable, an operational definition of that latent variable, and a measurement model that produces interval person measures" (p. 115-116). The VST was tested based on the Rasch model. It was determined that the items within the test perform as predicted and that the items in the test have a good fit with a high degree of unidimensionality (85.6% of the variance). Furthermore, a test of invariance was performed by selecting half of the questions per level (seventy questions) on two VST test forms. The disattentuated Pearson correlation resulted in score of 0.96 (p = .01) indicating that the measure is has a high degree of invariance and should produce "similar person ability estimates" (p. 112). Based on the validation of the VST, Beglar suggests that the VST is an effective measure of written receptive vocabulary knowledge for participants with a wide variety of vocabulary knowledge. After the completion of all conditions and assessments, participants were given the VST. The possible range of scores for the VST was 0-140. The VST took approximately 60 minutes to complete.

Reading proficiency level. Participants' reading proficiency level was analyzed through the use of the mandated state English Language Arts test, Student Assessment of Growth and Excellence (SAGE). This assessment measures students' reading proficiency through various multiple choice, matching, ordering, and short answer questions (www.sageportal.org). Data outcome reports from this measure include vertical scaled score with a range of 100 to 999 that can be used to evaluate student growth (Kennett, 2015). Analysis of construct validity of SAGE was conducted using a confirmatory analysis. The statistics indicate the first- and second-order models posited by the SAGE assessments fit the data well. This pattern was true across all grades. The guidelines for evaluating goodness of fit measures include the Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (Tucker & Lewis, 1973), the root mean square of approximation (RMSEA), and standardized root mean residual (SRMR). The CFI and TLI values were all equal to or greater than .95. The RMSEA values are all .01 and SRMR values between .02 and .04, well below the values used to indicate good fit (USOE, n.d.). This test was previously administered by school district personnel in accordance with state administration guidelines. Each participant's vertical scaled score from the spring of 2016 during the participants' seventh-grade year was included in the data analysis as a covariate to control for potential differences in reading proficiency across students.

Procedures

As announcement of vocabulary procedures and assessments are marks of

intentional vocabulary acquisition (Hulstijn, 2003) participants were not told that the tasks they are participating in are focused on vocabulary (Laufer, 2003). Instead, participants were told they were working on tasks to improve their literacy. In addition, the reading and the reading *and* writing conditions, directions encouraged students to read the texts for meaning and use the marginal glosses in order to comprehend the text. For the writing condition, participants were encouraged to understand the meaning of the pseudowords in order to write correct sentences. The order of delivery of the three instructional conditions was counterbalanced across students to control for potential order effect. As there are three possible conditions, there were three possible sequences of instructional delivery as provided on Table 20.

The school where the study took place used an A/B schedule where eight class periods were alternated every other day for approximately 80 minutes. Four class periods met on A day and are labeled A1-A4. The remaining four class periods met the following day (B day) and are labeled B1-B4. Teacher 1 taught eighth-grade English on A1, A2, A3, B2, and B3. Teacher 2 taught eighth-grade English A3, A4, B1, B2, B3, and B4. Instructional tasks and initial vocabulary acquisition measures (MC1) for the reading, writing, and reading *and* writing conditions were completed in consecutive A/B blocks,

Table 20

Order of Delivery

Delivery sequence	Instructional condition	Instructional condition	Instructional condition
1	Reading	Writing	Reading *and* writing
2	Writing	Reading *and* writing	Reading
3	Reading *and* writing	Reading	Writing

over a period of 6 days in each teacher's class. The VKS was given 2 days after the final instructional condition task as a measure of initial incidental vocabulary acquisition. Two weeks later, the VKS2 and MC2 were administered as a measure of delayed incidental vocabulary retention rate. The presentation order of the pseudowords was changed between the initial incidental vocabulary acquisition measures and incidental vocabulary acquisition retention measures to control for potential ordering effects (Keating, 2008). On the retention measures, the VKS2 was administered first, followed by MC2 because the questions of the MC2 could influence participants' answers on the VKS, which would reflect knowledge from the multiple choice test and not the instructional conditions (Waring & Takaki, 2003). All conditions and initial assessments were completed over a period of two weeks, with the retention measures completed two weeks later. The VST was completed a week later, for a total period of five weeks for the study. The study schedule is presented in Table 21.

For each condition, participants were given a packet containing collated materials. Each packet contained the instructional condition task, associated WRT, and associated

Table 21

Schedule of Study

School days	Description
1 or 2	Participants completed first randomly assigned condition, WRT, MC1
3 or 4	Participants completed second randomly assigned condition, WRT, MC1
5 or 6	Participants completed third randomly assigned condition, WRT, MC1
9 or 10	Participants completed the VKS1
21 or 22	Participants completed VKS2
23 or 24	Participants completed MC2
27 or 28	Participants completed VST

MC1. There were 12 possible sequence randomization orders participants could have followed, in order to counterbalance of stories in the study and among participants. A list of the possible randomizations is presented in Table 22. To ensure randomization, a research randomizer was used (http://www.randomizer.org). One set of numbers was generated for all 332 possible participants with a possible number range of 1-12. Table 23 presents an example of student randomization.

Before the instructional conditions were started, the teachers participating in the study were informed of how to deliver the study materials. A protocol was created to ensure directions for all instructional conditions and measures would be standardized across class periods. A script of instructions was created by the researcher for each condition and measure. The script was read to students before each condition in the study.

Table 22

Randomized Possible Order of Completion for Participants

Sequence possibility	Order of conditions	Story order
1	Reading, Writing, Reading & Writing	Riley and Leonard, The Eagle
2	Reading, Reading & Writing, Writing	Riley and Leonard, The Eagle
3	Writing, Reading, Reading, & Writing	Riley and Leonard, The Eagle
4	Writing, Reading & Writing, Reading	Riley and Leonard, The Eagle
5	Reading & Writing, Reading, Writing	Riley and Leonard, The Eagle
6	Reading & Writing, Writing, Reading	Riley and Leonard, The Eagle
7	Reading, Writing, Reading & Writing	The Eagle, Riley and Leonard
8	Reading, Reading & Writing, Writing	The Eagle, Riley and Leonard
9	Writing, Reading, Reading, & Writing	The Eagle, Riley and Leonard
10	Writing, Reading & Writing, Reading	The Eagle, Riley and Leonard
11	Reading & Writing, Reading, Writing	The Eagle, Riley and Leonard
12	Reading & Writing, Writing, Reading	The Eagle, Riley and Leonard

Table 23

Example of Randomization of Conditions

Student	Sequence
1	4
2	5
3	6
4	2
5	4
6	8
7	3
8	8
9	9
10	10
11	12
12	6
13	3
14	3
15	7
16	9
17	1
18	10
19	2
20	6

The importance of not telling students that the focus of the study was on vocabulary was stressed as well as the importance of following all instructions and protocols as written.

After receiving their respective packet, participants were instructed to read the directions on the cover page and raise their hands to ask questions about the condition. Only questions about the condition were answered to help control for potential instructor or coaching effects (Keating, 2008). Participants were instructed to complete the condition individually at their own pace. The two participating English teachers

monitored students to ensure that participating students were working individually to complete the condition tasks. Protocols and scripts were created for teachers to follow during the administration of the conditions and measures. Observations during the administration of conditions and measures were conducted by the researcher once per day. During the observation, the researcher silently reviewed the scripts and protocols as they were being administered to ensure the fidelity of the study.

When the instructional task was completed, each participant placed the instructional task back in the packet and removed the WRT. When the WRT was completed, participants placed it back in the folder. Participants then pulled out and completed MC1 for each condition. When the MC1 was completed, they returned it to the packet and left the packet on their desk. Participants were instructed to read non-condition related material quietly at their desk until all were finished. All folders were then collected by the teachers when all participants were finished. The total time for the three instructional conditions is presented in Table 24.

Data Collection and Analysis

All tests were collected and scored by the two English teachers at the school where the study took place. The researcher then visually screened and prepared the data

Table 24

Total Time on Conditions and Initial Assessments

Condition	Time on Task	Time on WRT	Time on MC1	Total Time
Reading	20 minutes	5 minutes	10 minutes	35 minutes
Writing	30 minutes	5 minutes	10 minutes	45 minutes
Reading & Writing	35 minutes	5 minutes	10 minutes	50 minutes

for statistical analysis. Preliminary analysis and descriptive statistics were used to investigate the means, standard deviation, and minimum and maximum scores.

To evaluate the first question of this study, does the instructional condition (reading, writing, reading and writing) affect initial incidental vocabulary acquisition gains of L1 eighth-grade students, participants' scores on the WRT, MC1, and VKS1 were analyzed. Due to non-normality of the WRT only descriptive statistics are reported for that measure. MC1 and VKS1 were analyzed using a mixed-effects model to analyze initial incidental vocabulary acquisition gains.

To evaluate the second question of this study, are there significant differences in incidental vocabulary retention rates based on instructional condition (reading writing, and reading *and* writing) for L1 eighth-grade students, the scores from measures MC2 and VKS2 were analyzed for retention of incidental vocabulary acquisition.

Finally, to evaluate the third question of this study, what is the relationship between students' overall vocabulary size and incidental vocabulary gains, the scores from VST and SAGE were analyzed for any significant differences or interaction based on reading proficiency level or vocabulary level.

Scoring for all outcome measures followed the same protocol. All measures were collected and blind scored by the two teachers using the respective scoring sheets and answer keys. Randomly, two out of every ten measures were exchanged between the two teachers and crosschecked for accuracy. There were no discrepancies in test scores.

Threats to Internal and External Validity

There are some possible threats to the validity of studies of incidental vocabulary acquisition such as this one. One such threat is that students may accidentally learn target words outside of the study. In order to control for this threat, pseudowords were used. Pseudowords are useful to control validity as they help to stop learners from looking up and learning the words outside of the study and in-between assessments. Pseudowords are also used to help ensure that no previous knowledge of the words is present and removes the need to check for previous knowledge of the words (Keating, 2008; Pichette et al., 2012; Pulido, 2003). Thus, this threat has been managed.

Another threat to validity is multiple-treatment interference. Due to the repeated-measure design of this study, it was possible that students performed better on the second and third condition because of previous treatments. To help control for this threat, the order of the instructional condition conditions was counterbalanced. Furthermore, to control for the order of the question appearing affecting the measurement outcome, the order in which the pseudoword questions appeared was varied among participants. In MC1, there were six different order sequences (Table 25), which were randomly assigned. In the outcome measure MC2, VKS1, and VKS2 there two different forms were created (Form A and Form B). Each form had a different order in which the questions appeared. Participants completing MC2 were randomly assigned to either Form A or Form B. Participants were also randomly assigned to Form A or Form B for the VKS1. For VKS2, participants completed the other form that they did not complete for VKS1.

Table 25

Possible Sequence Order for MC1

Sequence	Pseudoword list order
1	1, 2, 3
2	1, 3, 2
3	2, 3, 1
4	2, 1, 3
5	3, 1, 2
6	3, 2, 1

Summary

This study investigated incidental vocabulary acquisition through three conditions (reading, writing, reading *and* writing). Specifically, this study sought to measure which of the three instructional conditions lead to higher incidental vocabulary acquisition among L1 middle school students. Furthermore, this study explored whether there was a difference in short-term or delayed recall of incidentally gained vocabulary. Finally, this study analyzed reading proficiency and vocabulary size as explanatory variables for incidental vocabulary acquisition of L1 eighth-grade students. Data was evaluated using mixed-effects models.

CHAPTER IV

DATA ANALYSIS

This study investigated the effectiveness of three conditions on incidental acquisition of vocabulary with middle school participants in an L1 environment. Two hundred sixty-four participants participated in the study. The study design used was within-subject, repeated measures. As vocabulary knowledge is essential for successful reading and writing (Beck et al., 1982; Browne, 2003; Nagy, 1988; Ryland et al., 2012; Webb, 2005) and because word knowledge comes primarily from incidental vocabulary acquisition (Beal, 2007; Brown, 2008; Gass, 1999; Huckin, 1999; Hulstijn, 2003; Laufer, 2001; Nagy et al., 1985), this study was designed to examine the effects of three instructional conditions (reading, writing, and reading *and* writing) on incidental vocabulary acquisition for L1 eighth-grade participants. Multi-level modeling was used for data analysis.

Descriptive Statistics Results

Descriptive statistics were computed to examine the distributions and measures of central tendencies for each of the outcome measures of the study: Word Recognition Test (WRT), immediate multiple-choice (MC1), delayed multiple-choice (MC2), and Vocabulary Knowledge Scale (VKS). These examinations were done as a preliminary investigation of study variables.

Assumptions: Word Recognition Test

A WRT was used to evaluate the lowest level of incidental vocabulary acquisition—simple recognition of the target words. A 13-item WRT test was created for each of the three conditions. The WRT tests consisted of eight pseudo-words that were introduced in the instructional condition and five distractor pseudowords that were not used in the study. Participants completed a WRT test immediately upon completion of each of the three instructional conditions. Participants were instructed to circle the words they recognized from the instructional condition. One point was given for each pseudoword identified and one point was given for each distractor *not* circled. Scores on this assessment could possibly range from 0-13.

Examination of the score distributions for the three WRT measures revealed that score distributions were negatively skewed and suffered from a ceiling effect, as presented in Table 26. Figure 7 shows the distribution of WRT scores. In an attempt to normalize the data, transformations of log 10, natural log, and square root were performed. None of the transformations alleviated the non-normality of the data.

Table 26

WRT Skewness and Kurtosis

	Skewness		Kurtosis	
WRT Condition	Statistic	*SE*	Statistic	*SE*
Reading	-1.340	.150	1.594	.299
Writing	-1.964	.150	3.552	.299
Reading and writing	-2.205	.150	5.564	.299
Total	-1.335	.150	1.474	.299

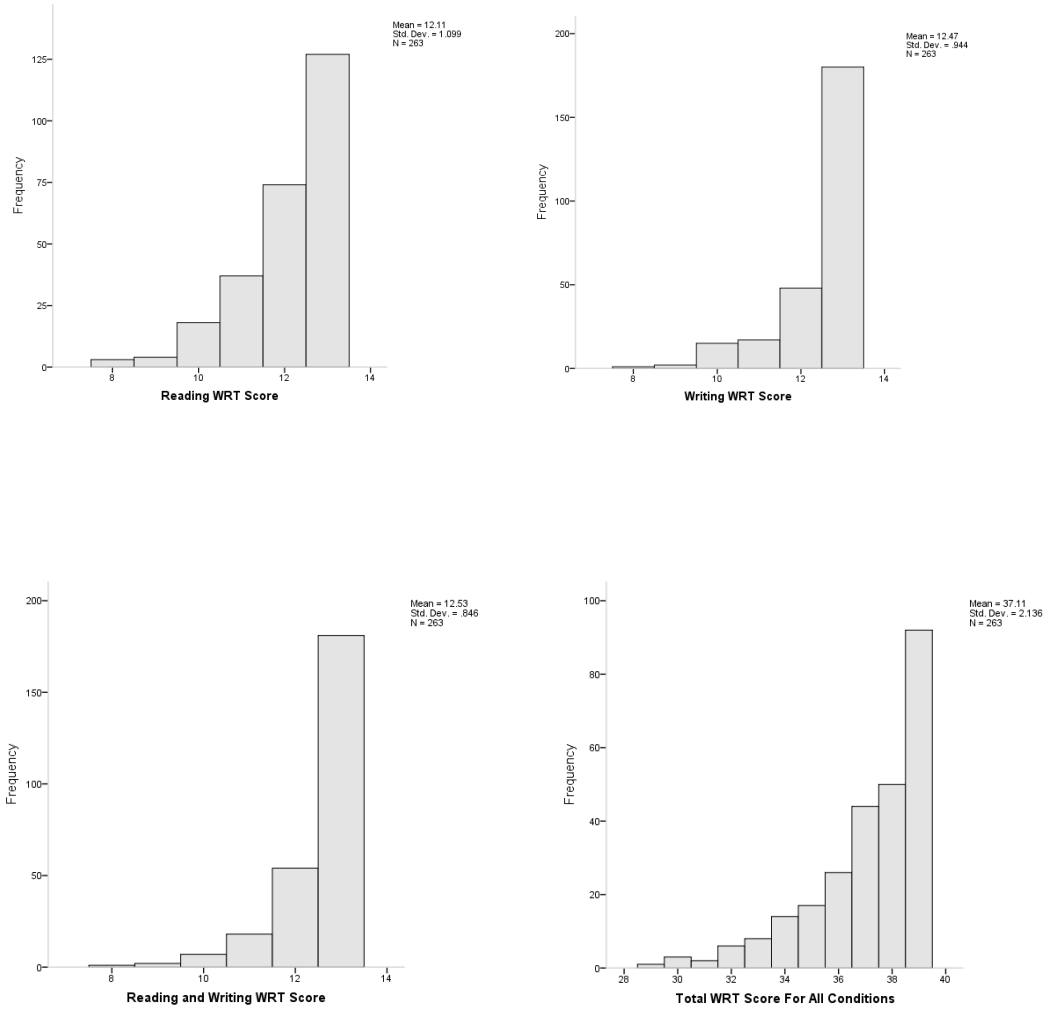

Figure 7. Histograms showing distribution of WRT scores.

The range of WRT scores for the three conditions (reading, writing, and reading and writing) was 8 to 13. The data for the three WRT measures were cleaned to address outliers. Two outliers were removed from the data sets due to testing error. Three other outliers were present in the data (participant #69, #75, & #289). After examination of these participants' scores on all measures and reviewing their completed assessments, it

was determined that the outlier scores were was not representative of the participants' knowledge, but was the result of misunderstanding directions. Thus, the mean was imputed for these three outlier scores. A description of distribution and outliers for WRT is shown in Figure 8.

A bivariate Pearson correlation was run on the results of the WRT measures. Based on Cohen's (1988) interpretation of correlation coefficient, correlations for the three WRT measures were statistically significant (Table 27). Between reading and

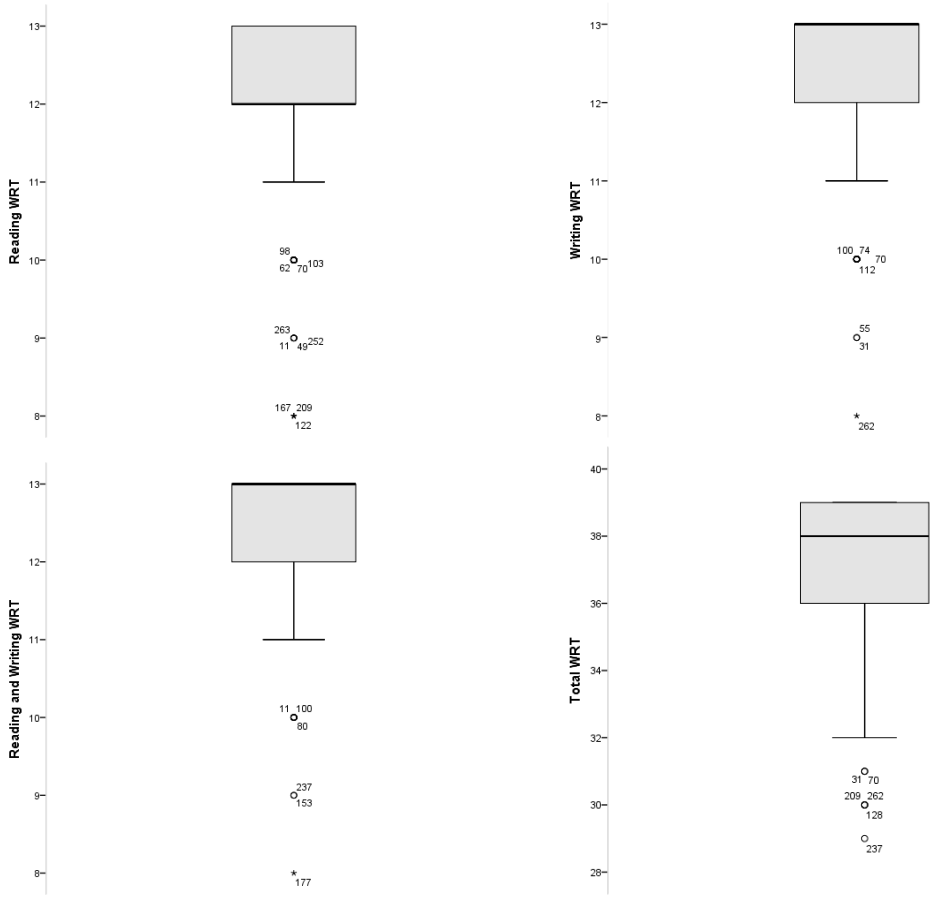

Figure 8. Boxplots showing distribution and outliers of WRT scores.

Table 27

Correlations of WRT Scores

WRT Measure	Reading	Writing	Reading & Writing
Reading	1	.386*	.271*
Writing	--	1	.277*
Reading & Writing	--	--	1

** Correlation is significant at the .01 level.*

writing, the correlation was medium (r = .386). Between reading and reading *and* writing the correlation was small, but approaching medium (r = .271). Between writing and reading *and* writing, the correlation was small (r = .277).

Descriptive statistics were analyzed for the WRT measures (Table 28). The reading condition had the lowest mean of the three measures (M = 12.11, SD = 1.099). The writing condition had a higher mean than reading (M = 12.47, SD = .944). The reading *and* writing condition had the highest mean (M = 12.53, SD = .846).

Assumptions: Immediate Multiple-Choice Measure

Participants' incidental vocabulary acquisition of words from each of the three instructional conditions was measured using three immediate 16-item multiple-choice measures (MC1) created for each of the three conditions. Each MC1 consisted of eight questions about the meaning of the pseudowords introduced in the instructional condition and eight comprehension questions. Only the questions about the pseudowords were used in the data analysis.

After completing the instructional condition and WRT, participants completed the MC1 test. Participants were instructed to circle the best answer from five choices: one

Table 28

WRT Descriptive Statistics

	Mean						
	Statistic	*SE*	Median	*SD*	Variance	Minimum	Maximum
WRT Reading	12.11	.068	12	1.099	1.208	8	13
WRT Writing	12.47	.058	13	.944	.891	8	13
WRT Reading & Writing	12.53	.052	13	.846	.716	8	13
WRT Total	37.11	.132	38	2.136	4.564	29	39

correct answer, three distractors, and one option of "I don't know" to control for guessing. If participants did not know the answer, they were instructed to circle "I don't know" to control for guessing. One point was given for each correct answer. Scores on this assessment could range from 0-8. Examination of the score distributions for the three MC1 measures revealed that score distributions were negatively skewed and suffered from a ceiling effect (Table 29). Figure 9 shows the distribution of MC1 scores. In an attempt to normalize the data, transformations of log 10, natural log, and square root were performed. None of the transformations alleviated the non-normality of the data.

The range of the MC1 scores for the reading condition was 1-8. The data for the MC1 reading condition were checked for outliers. The five outliers (participants #63, #82, #96, #332, and #229) remained in the data. Outlier scores were compared to the participants' other scores on the instructional condition measures and to their score on the reading proficiency measure. The outlying scores were determined to be accurate as the participants scored low on the MC1 and were below average in the reading measures for WRT, VKS, and SAGE (reading proficiency). The range of the MC1 scores for the

Table 29

MC1 Skewness and Kurtosis

	Skewness		Kurtosis	
MC1 condition	Statistic	*SE*	Statistic	*SE*
Reading	-3.191	.150	13.042	.299
Writing	-6.88	.150	54.24	.299
Reading and writing	-5.58	.150	42.45	.299
Total	-2.74	.150	9.25	.299

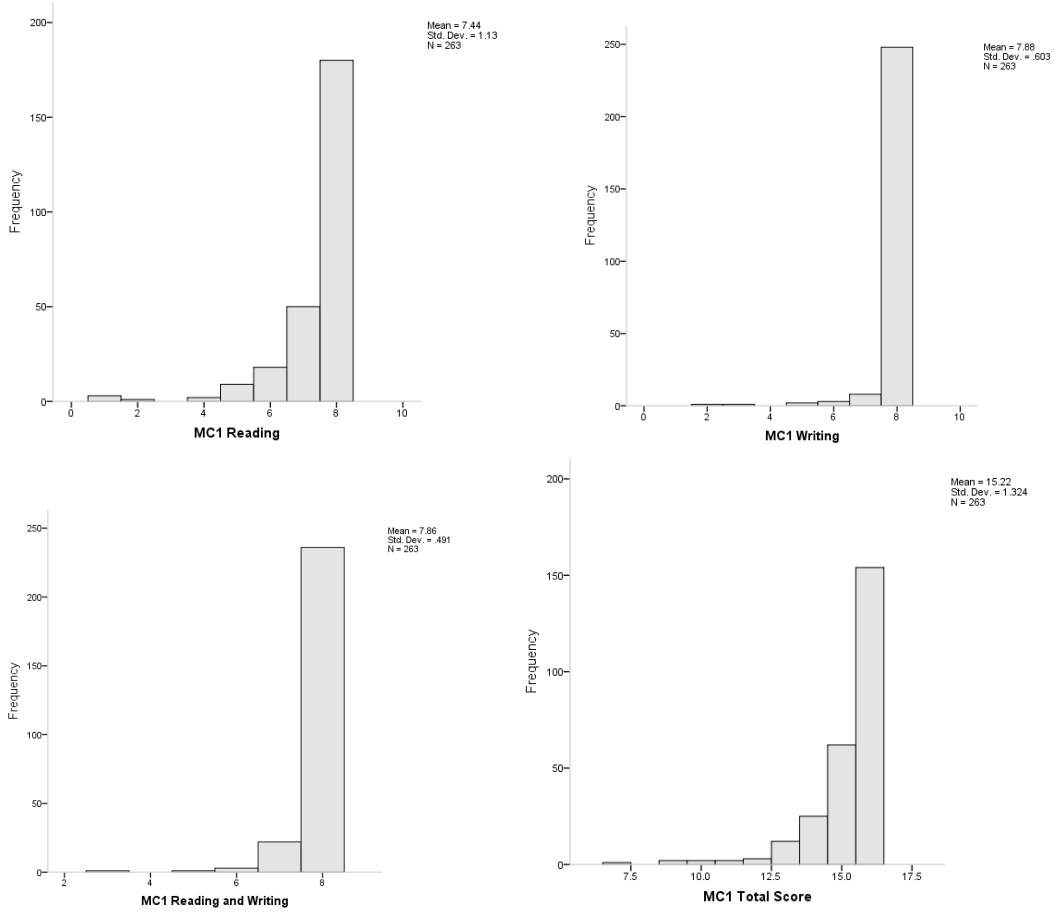

Figure 9. Histograms showing distribution of MC1 scores.

writing condition was 2-8. The data for the MC1 writing condition were checked for outliers. The two outliers (participant #13 and #274) were determined to be accurate scores after analyzing the participants' other scores on the measures involving writing in this study. The range of the MC1 scores for reading *and* writing was 3-8. The data for the MC1 reading *and* writing condition were checked for outliers. One outlier (participant #159) was determined to be an accurate representation of the participant. The distribution and outliers for the MC1 outcome measures are shown in Figure 10.

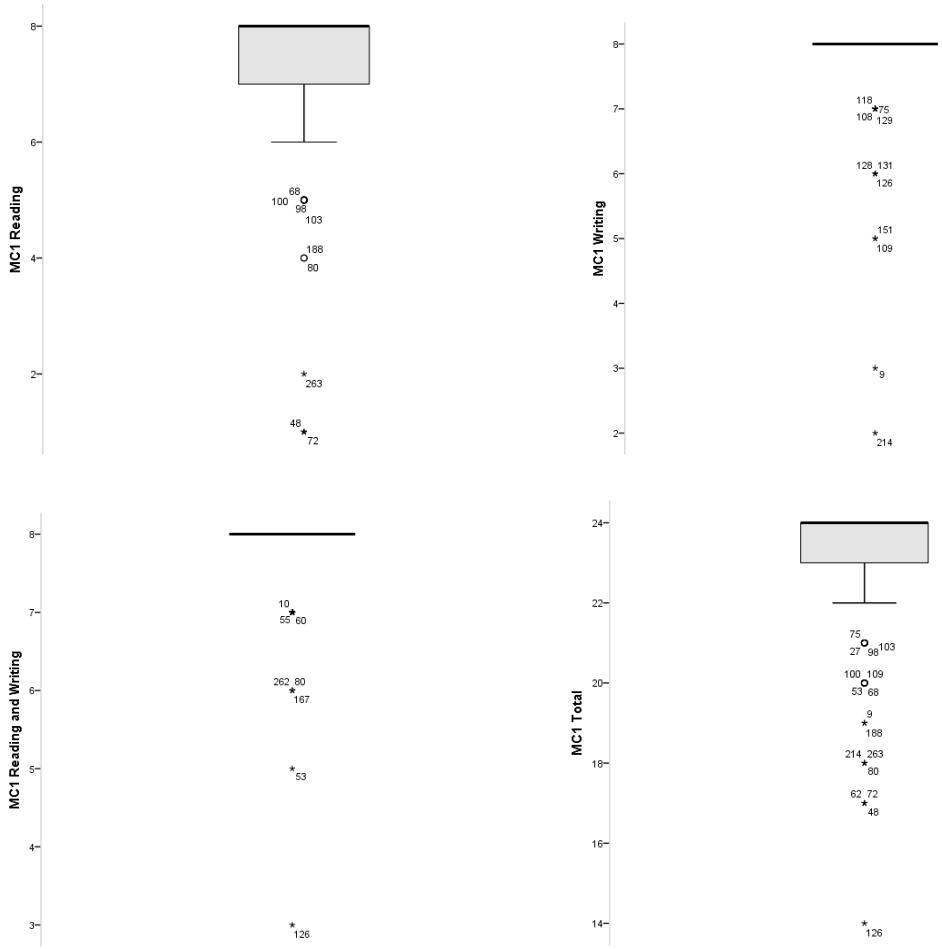

Figure 10. Boxplots showing distribution of MC1 scores.

A bivariate Pearson correlation was run on the results of the MC1 measures. Based on Cohen's (1988) interpretation of correlation coefficient, correlations between the three MC1 measures had mixed statistical significance (Table 30). Between reading and writing, the correlation was small (r = .003) and not significant. Between reading and reading *and* writing the correlation was small (r = .239) and statistically significant. Between writing and reading *and* writing, the correlation was small (r = .100) and not statistically significant.

Descriptive statistics were analyzed for the MC1 measures (Table 31). The reading condition had the lowest mean of the three multiple-choice measures (M = 7.44, SD = 1.09). The reading *and* writing condition had a higher mean than reading (M = 7.86, SD = .49). The writing condition had the highest mean (M = 7.88, SD = .60).

Assumptions: Delayed Multiple-Choice Measure

Participants' retention of incidental vocabulary acquisition of words in each of the three instructional conditions was measured with a delayed, 24-item multiple-choice measure (MC2) created by the researcher. All 24 questions were about the meaning of the pseudowords introduced in the three instructional conditions. Participants were

Table 30

Correlations of MC1 Scores

MC1 Measure	Reading	Writing	Reading & Writing
Reading	1	.003	.239*
Writing	--	1	.100
Reading & Writing	--	--	1

* Correlation is significant at the .01 level.

Table 31

MC1 Descriptive Statistics

	Mean						
MC1 condition	Statistic	*SE*	Median	*SD*	Variance	Minimum	Maximum
Reading	7.44	.070	8	1.130	1.278	1	8
Writing	7.88	.037	8	.603	.364	2	8
Reading & Writing	7.86	.030	8	.491	.241	3	8
Total	23.18	.092	24	1.487	2.211	14	24

instructed to circle the best answer from five choices, as was done in the MC1. One point was given for each correct answer. Scores on this assessment could range from 0-24.

Examination of the score distributions for the MC2 measure revealed that score distributions were approximately normally distributed (Table 32). Figure 11 presents the distribution of the MC2 scores.

The total range of the MC2 scores was 4-23. The data for MC2 were checked for outliers and no significant outliers were present in any of the instructional conditions in MC2. The range of MC2 scores for the reading condition was 0-8. The range of MC2 scores for the writing condition was 1-8. The range of MC2 scores for the reading *and* writing condition was 0-8. A description of distribution and outliers for the MC2 is shown in Figure 12.

A bivariate Pearson correlation was run on the results of the MC2 measures. Based on the Cohen's (1988) interpretation of the correlation coefficient, correlations between the three components of the MC2 measure were statistically significant (Table 33). Between reading and writing, the correlation was small (r = .257). Between reading

Table 32

MC2 Skewness and Kurtosis

	Skewness		Kurtosis	
MC2 condition	Statistic	*SE*	Statistic	*SE*
Reading	-0.113	.150	-0.364	.299
Writing	-0.572	.150	.185	.299
Reading and Writing	-0.709	.150	.262	.299
Total	-0.454	.150	.033	.299

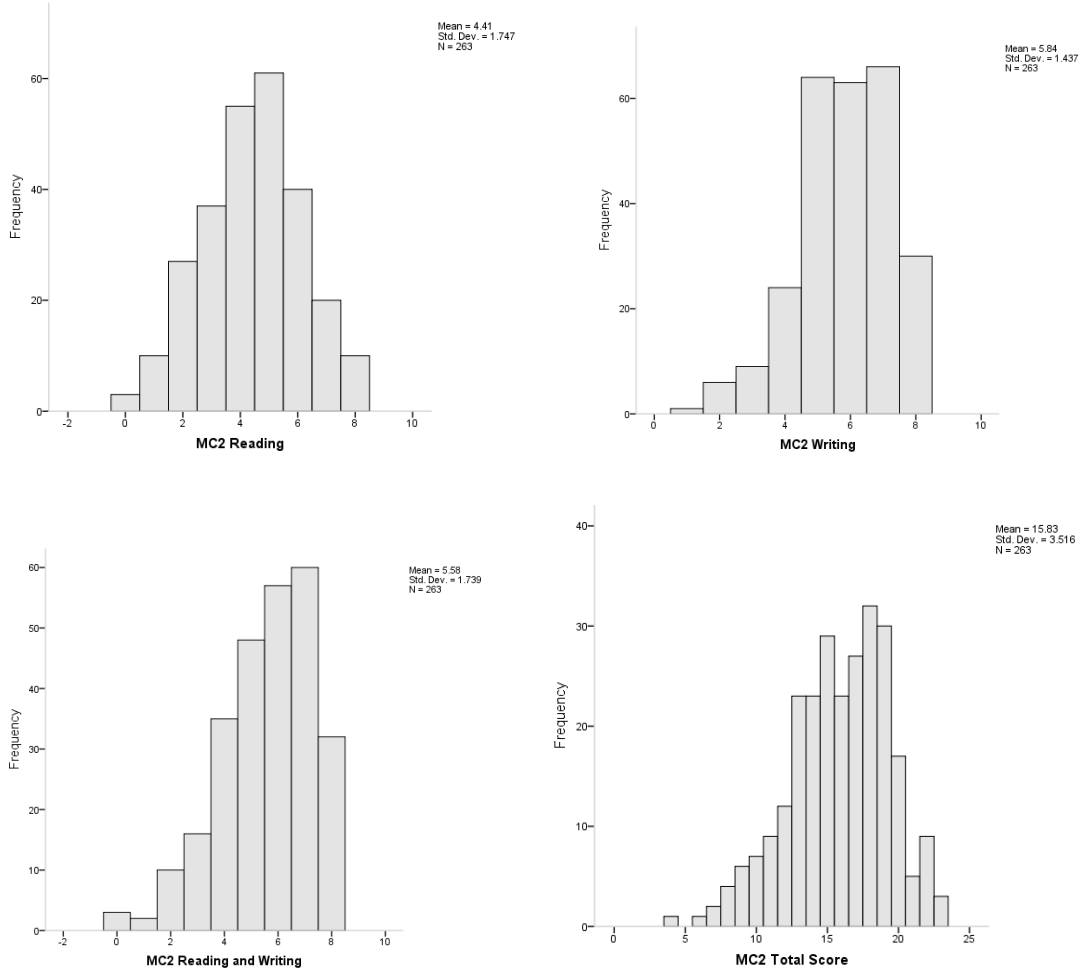

Figure 11. Histograms showing distribution of MC2 scores.

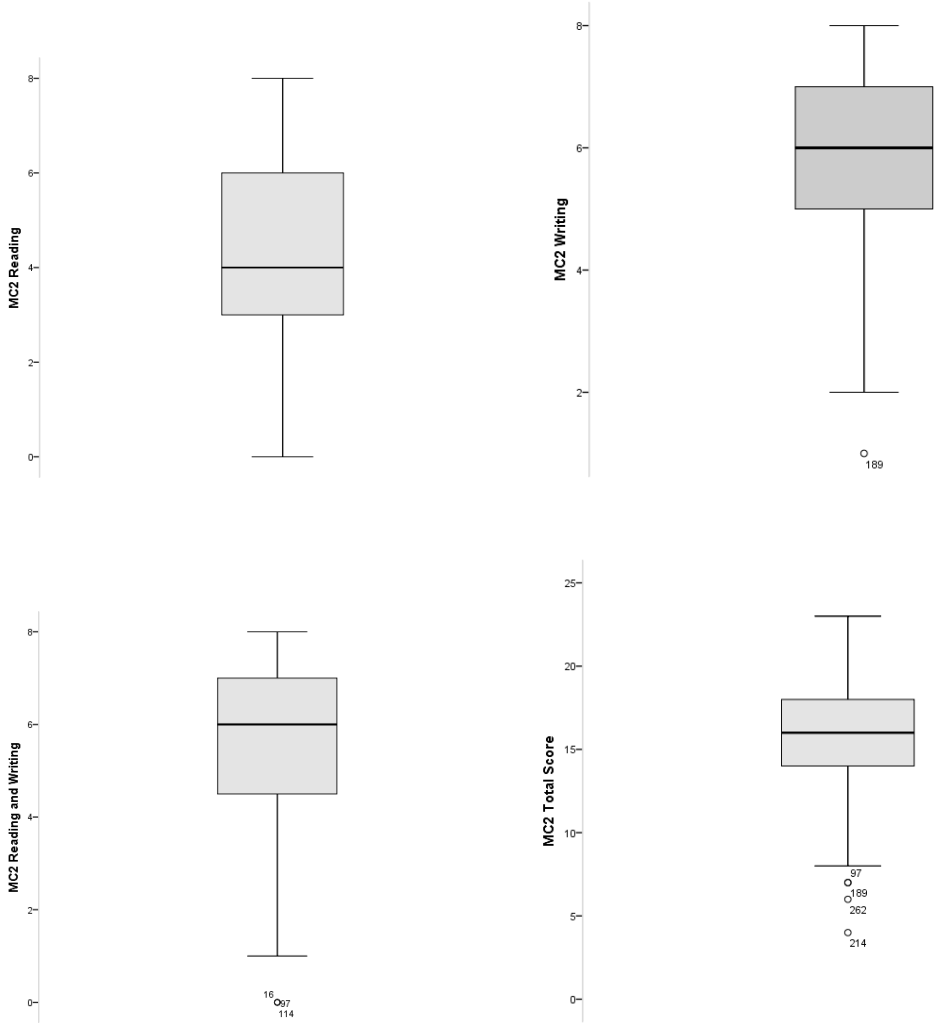

Figure 12. Boxplots showing the distribution of MC2 scores.

Table 33

Correlations of MC2 Data

MC2 measure	Reading	Writing	Reading & Writing
Reading	1	.257*	.196*
Writing	--	1	.347*
Reading & Writing	--	--	1

* Correlation is significant at the .01 level.

and reading *and* writing the correlation was small (r = .196). Between writing and reading *and* writing, the correlation was medium (r = .347).

Descriptive statistics were analyzed for the three instructional conditions of the MC2 measure (Table 34). The reading condition had the lowest mean of the three instructional conditions (M = 4.41, SD = 1.747). The reading *and* writing condition had a higher mean than reading (M = 5.58, SD = 1.739). The writing condition had the highest mean (M = 5.84, SD = 1.437).

Assumptions: Immediate Vocabulary Knowledge Scale

Participants' incidental vocabulary acquisition of words used in the instructional conditions was also measured using a Vocabulary Knowledge Scale (VKS1). VKS was chosen in this study as it has been stated to be an effective assessment to measure vocabulary growth before, during, and after an instructional condition; it has also been shown to be sensitive enough to measure even small vocabulary gains (Doughtery-Stahl & Bravo, 2010; Wesche & Paribakht, 1996). A 24-item VKS test was created for use

Table 34

MC2 Descriptive Statistics

	Mean						
MC2 condition	Statistic	*SE*	Median	*SD*	Variance	Minimum	Maximum
Reading	4.41	.108	4	1.747	3.052	0	8
Writing	5.84	.089	6	1.437	2.066	1	8
Reading & writing	5.58	.107	6	1.739	3.023	0	8
Total	15.83	.217	16	3.516	12.361	4	23

after participants had completed all three instructional conditions. The 24 items on the VKS were comprised of the eight words used in each of the three instructional conditions. Participants were provided the twenty-four pseudowords used in this study in one of two inverted forms (Form A or Form B); participants were randomly assigned to test forms. For each of the words, participants were instructed to mark the boxes next to the best description of their understanding of the word. The participants could mark five levels:

1. I don’t remember having seen this word before
2. I have seen this word before, but I don’t know what it means
3. I have seen this word before and I think it means (synonym or definition):
4. I know this word; it means:
5. I can use this word in a sentence (write a sentence; if you do question #5, please also complete question #4).

One point was given if the participant marked level 1. Two points were given if the participant marked level 2 or marked level 3, 4, or 5 but gave an incorrect definition. Three points were given if participants marked level 3, 4, or 5 and only provided a correct definition. Four points were given if participants marked level 5, gave a correct definition, but did not use the word correctly in a sentence. Finally, a score of 5 was given if level 5 was marked, a correct definition was given, and the word was used correctly in a sentence. Scores on this assessment could possibly range from 0-120.

Examination of the score distribution for the VKS1 measure revealed that score distributions were approximately normally distributed (Table 35). Figure 13 shows the distribution of VKS1 scores.

Table 35

VKS1 Skewness and Kurtosis

	Skewness		Kurtosis	
VKS condition	Statistic	*SE*	Statistic	*SE*
Reading	2.293	.150	10.565	.299
Writing	1.884	.150	6.831	.299
Reading and writing	1.121	.150	1.651	.299
Total	.783	.150	1.642	.299

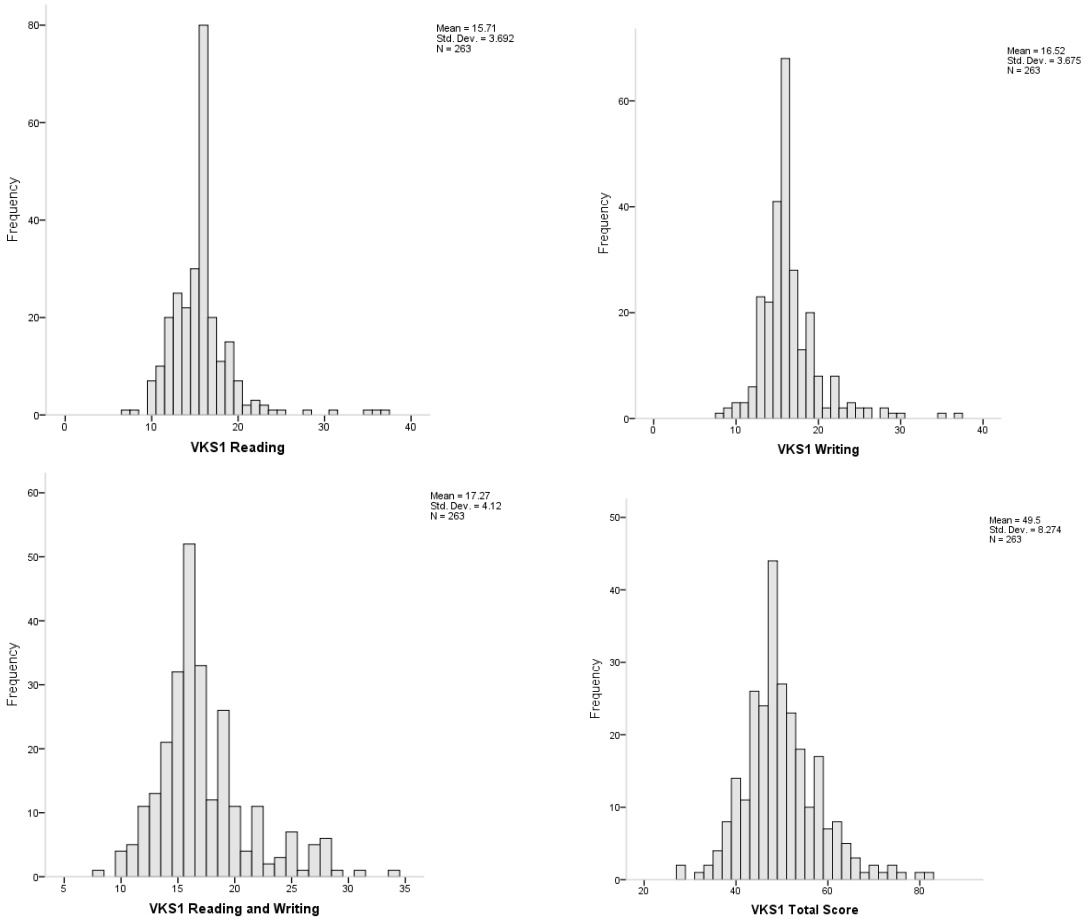

Figure 13. Histograms showing distribution of VKS1 scores.

The total range of the VKS1 scores was 26-81. The data for VKS1 were checked for outliers and no significant outliers were present in any of the instructional conditions in VKS1. The range of VKS1 scores for the reading condition was 7-37. The range of VKS1 scores for the writing condition was 8-37. The range of VKS1 scores for the reading *and* writing condition was 8-34. A description of distribution and outliers for VKS1 is shown in Figure 14.

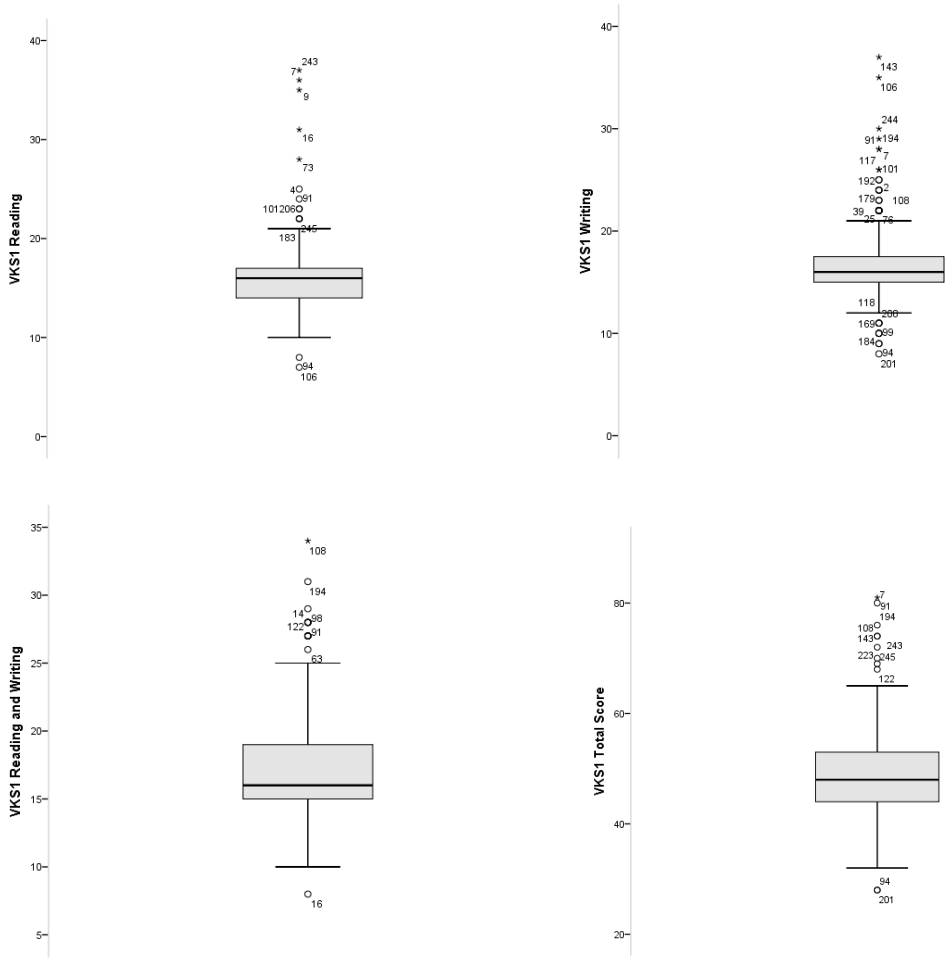

Figure 14. Boxplots showing distribution of VKS1 scores.

A bivariate Pearson correlation was run on the results of the VKS1 measures. Based on Cohen's (1988) interpretation of the correlation coefficient, correlations for three instructional conditions within the VKS1 measure were between small and moderate (Table 36). Between reading and writing, the correlation was small (r = .260). Between reading and reading *and* writing the correlation was small (r = .163). Between writing and reading *and* writing, the correlation was medium (r = .413).

Descriptive statistics were analyzed for the three instructional conditions within the VKS1 measure (Table 37). The reading condition had the lowest mean of the three instructional conditions (M = 15.71, SD = 3.69). The writing condition had a higher mean

Table 36

Correlations of VKS1 Scores

VKS1 Measure	Reading	Writing	Reading & Writing
Reading	1	.260*	.163*
Writing	--	1	.413*
Reading & Writing	--	--	1

* Correlation is significant at the .01 level.

Table 37

VKS1 Descriptive Statistics

	Mean						
VKS1 condition	Statistic	*SE*	Median	*SD*	Variance	Minimum	Maximum
Reading	15.71	.228	16	3.692	13.628	7	37
Writing	16.52	.227	16	3.675	13.502	8	37
Reading & Writing	17.27	.254	16	4.120	16.971	8	34
Total	49.50	.510	48	8.274	68.465	28	81

than reading (*M* = 16.52, *SD* = 3.68). The reading *and* writing condition had the highest mean (*M* = 17.27, *SD* = 4.12).

Assumptions: Delayed Vocabulary Knowledge Scale

The VKS2 was administered two weeks after participants completed VKS1 to evaluate the retention of incidental vocabulary acquisition. To control for order effects, participants were given the other form of the assessment they did not complete in VKS1 (Form A or Form B). Examination of the score distributions for the VKS2 measure revealed that score distributions were approximately normally distributed (Table 38). Figure 15 presents the distribution of VKS2 scores.

The total range of the VKS2 scores was 26-81. The data for VKS2 were checked for outliers and no significant outliers were present in any of the instructional conditions in VKS2. The range of VKS2 scores for the writing condition was 8-32. The range of VKS2 scores for the reading *and* writing condition was 8-33. A description of distribution and outliers for VKS2 is shown in Figure 16.

Table 38

VKS2 Skewness and Kurtosis

	Skewness		Kurtosis	
VKS2 condition	Statistic	*SE*	Statistic	*SE*
Reading	2.647	.150	12.764	.299
Writing	1.904	.150	6.181	.299
Reading and writing	1.175	.150	2.646	.299
Total	.870	.150	2.371	.299

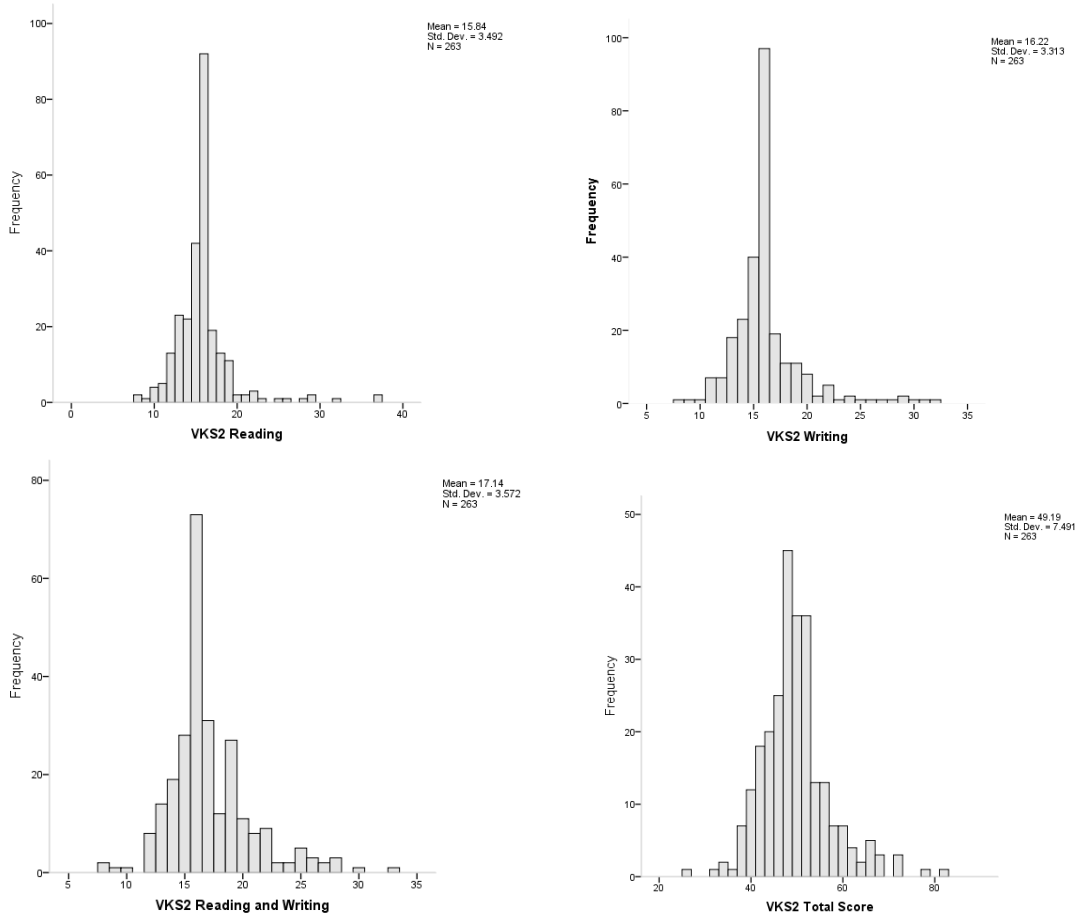

Figure 15. Histograms showing distribution of VKS2 scores.

A bivariate Pearson correlation was run on the results of the VKS2 measures. Based on Cohen's (1988) interpretation of the correlation coefficient, correlations for three instructional conditions within the VKS2 measure were between small and moderate (Table 39). Between reading and writing, the correlation was small (r = .293). Between reading and reading *and* writing the correlation was small (r = .182). Between writing and reading *and* writing, the correlation was medium (r = .375).

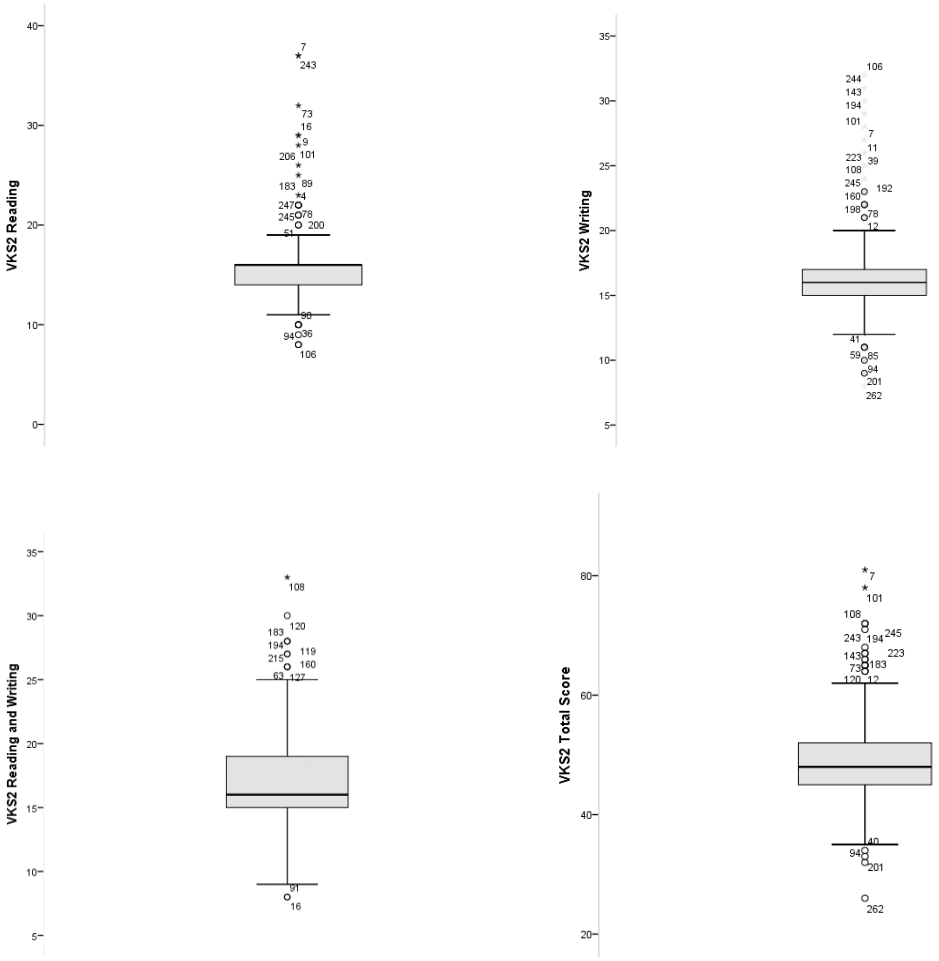

Figure 16. Boxplots showing distribution of VKS2 scores.

Table 39

Correlations of VKS2 Scores

VKS2 measure	Reading	Writing	Reading & Writing
Reading	1	.293*	.182*
Writing	--	1	.375*
Reading & Writing	--	--	1

* Correlation is significant at the .01 level.

Descriptive statistics were analyzed for the three instructional conditions within the VKS2 measure (Table 40). The reading condition had the lowest mean of the three instructional conditions (*M* = 15.84, *SD* = 3.492). The writing condition had a higher mean than reading (*M* = 16.22, *SD* = 3.313). The reading *and* writing condition had the highest mean (*M* = 17.14, *SD* = 3.572).

A bivariate Pearson correlation was conducted for the outcome measures. Based on Cohen's (1988) interpretation of the correlation coefficient, correlations between most measures were significant ($p < .01$; Table 41). WRT had the highest reliability with the MC1 test, which is to be expected as participants completed these two tests consecutively in this study. The correlation between VKS1 and VKS2 was large, indicating strong reliability of this measure. The correlation between MC1 and MC2 was medium, also an indication of reliability between this repeated measure. The correlations of WRT, MC1, and MC2 with the more-established VKS indicate the usefulness of these measures created for this study as an indicator of incidental vocabulary acquisition.

Table 40

VKS2 Descriptive Statistics

	Mean						
VKS2 condition	Statistic	*SE*	Median	*SD*	Variance	Minimum	Maximum
Reading	15.84	.215	16	3.492	12.191	8	37
Writing	16.22	.204	16	3.313	10.974	8	32
Reading & Writing	17.14	.220	16	3.572	12.760	8	33
Total	49.19	.462	48	7.491	56.119	26	81

Table 41

Correlations of Outcome Measures

Measure	WRT	MC1	MC2	VKS1	VKS2	VST	SAGE
WRT	1	.431**	.197**	.355**	.293**	.072	-0.076
MC1	--	1	.226**	.122*	.144**	.167**	.193**
MC2	--	--	1	.426**	.366*	.306**	.338**
VKS1	--	--	--	1	.743**	.193**	.119
VKS2	--	--	--	--	1	.174**	.152*
VST	--	--	--	--	--	1	.424**
SAGE	--	--	--	--	--	--	1

* Correlation is significant at the .05 level.
** Correlation is significant at the .01 level.

Data Analysis: Mixed-Effects Model Results

The purpose of this study was to better understand the effect of three instructional conditions on incidental vocabulary acquisition for L1 eighth-grade students. Outcome measures included two repeated measures: multiple-choice and VKS. A two level mixed-effects model was used for analysis of these two outcome measures, as a mixed-effects model allows for repeated measures within subjects. In this study, the first level was repeated measures over time; the second level was student. Hypothesis tests were conducted to examine the effects of three instructional conditions on incidental vocabulary acquisition and retention. Additionally, tests were conducted to examine the influence of the explanatory variables of vocabulary level and reading proficiency and on incidental vocabulary acquisition and retention. If the models show statistically significant differences between instructional conditions on incidental vocabulary acquisition, the results will support the modified ILH theory as used in this study and the

inclusion of reading *and* writing for L1 eighth-grade students for increased incidental vocabulary acquisition. This section presents the results of the mixed-effects model in relation to the three guiding questions of this study.

Question 1

Question 1 of this study was: For L1 eighth-grade students, does the instructional condition (reading, writing, and reading *and* writing) affect initial incidental vocabulary acquisition gains? Three outcome measures (WRT, MC1 and VKS1) were used to evaluate incidental vocabulary gains for each of the three instructional conditions.

Word Recognition Test (WRT). Due to the non-normality of the WRT data, a mixed-effect model analysis was not conducted. Interpretation is provided based only on descriptive data for this measure. Participants scored slightly higher on the WRT after the reading *and* writing condition (*M* = 12.53, *SD*= .846) than they did on either the writing only (*M* = 12.47, *SD* = .944) or reading only (*M* = 12.11, *SD* = .1.099) conditions. However, these differences are within the standard deviation, indicating there is no statistically significant difference between the three conditions on this measure. The descriptive statistics of WRT are presented in Table 42.

Table 42

Descriptive Statistics of WRT Data

			Mean			Skew		Kurtosis	
WRT condition	Min.	Max.	Stat.	*SE*	*SD*	Stat.	*SE*	Stat	*SE*
Reading	5	8	12.11	.068	1.099	1.340	.150	1.594	.299
Writing	5	8	12.47	.058	.944	-1.964	.150	3.552	.299
Reading & Writing	5	8	12.53	.052	.846	-2.205	.150	5.564	.299
Total	10	29	37.11	.132	2.136	-1.335	.150	1.474	.299

Multiple-choice test (MC1). A two level mixed-effect model was used to evaluate incidental vocabulary acquisition on the multiple choice (MC1) outcome measure. The model equation for this outcome measure was:

$$\text{MC1} = \beta_{00} + \beta_{01i} * \text{Condition}_{ti} + \beta_{02} * \text{Time}_{ti} + \lambda_{01} * \text{Time}_{ti} + u_{0i} + e_{ti}$$

Results of the mixed-effects model indicated significant differences for incidental vocabulary acquisition for the three instructional conditions, $F(2, 789) = 27.464$, $p < .001$. It should be noted that due the non-normality of this data, results should be interpreted with caution. The results of the data analysis for the MC1 are presented in Table 43.

Vocabulary Knowledge Scale (VKS1). A two level mixed-effects model was used to evaluate incidental vocabulary acquisition as measured by the Vocabulary Knowledge Scale (VKS1). The model equation for this outcome measure was:

$$\text{VKS1} = \beta_{00} + \beta_{01i} * \text{Condition}_{ti} + \beta_{02} * \text{Time}_{ti} + \lambda_{01} * \text{Time}_{ti} + u_{0i} + e_{ti}$$

Results of the mixed-effects model on VKS1 indicated significant differences for incidental vocabulary acquisition for the three instructional conditions, $F(2, 789) = 11.182$, $p < .001$. When the reading *and* writing condition was compared to the reading condition, the average participant scored 1.577 fewer points on the VKS1 assessment for

Table 43

Mixed-Effects Analysis of MC1 Data

Parameter	Estimate	*SE*	*df*	*t*	*p*
Intercept	7.863	.048	789	161.015	.000
Reading	-0.433	.069	789	-6.276	.000
Writing	0.019	.069	789	0.275	.783
Reading & Writing	0	0			

reading than for the assessment on reading *and* writing ($p < .001$). The results of the analysis were also significant when comparing the writing condition to the reading *and* writing condition; the average participant scored .749 fewer points on the VKS1 assessment following the writing assessment than on the reading *and* writing assessment ($p < .001$). The results of the data analysis for the VKS1 are presented in Table 44.

For Question 1 of this study, results indicate for immediate acquisition of incidental vocabulary acquisition, the means of the three instructional conditions had some significant differences. The reading *and* writing condition mostly produced the highest acquisition scores, while the reading condition mostly produced the lowest acquisition scores. Table 45 presents the order of effects of each of the measures for the three conditions.

Table 44

Mixed-Effects Analysis of VKS1 Data

Parameter	Estimate	*SE*	*df*	*t*	*p*
Intercept	17.273	.236	789	73.181	.000
Reading	-1.577	.333	789	-4.727	.000
Writing	-0.749	.333	789	-2.244	.025
Reading & Writing	0	0			

Table 45

Immediate Incidental Vocabulary Acquisition Measures and Order of Effect

Measure	Order of Effect
WRT	RW = W = R
MC1	RW = W > R
VKS1	RW > W > R

Note. RW = reading *and* writing, W = writing, R = reading.

Question 2

Question 2 of this study was: For L1 eighth-grade participants, are there significant differences in incidental vocabulary retention rates based on instructional condition (reading, writing, reading *and* writing)? Two repeated outcome measures (MC1 and MC2, VKS1 and VKS2) were used to evaluate incidental vocabulary retention for each of the three instructional conditions.

Incidental vocabulary acquisition retention as measured by multiple-choice measure. A two level mixed-effect model was used to evaluate the retention of incidental vocabulary acquisition based on the three instructional conditions as measured by differences between the MC1 and MC2 assessments. The model equation was:

$$\text{MC Retention} = \beta_{00} + \beta_{01i} * \text{Condition}_{ti} + \beta_{02} * \text{Mean difference}_{ti} + \lambda_{01} * \text{Mean difference}_{ti} + u_{0i} + e_{ti}$$

Results of the mixed-effects model indicated significant differences between the retention of incidental vocabulary based on the three instructional conditions, $F(2, 789) = 44.034$, $p < .001$. The reading condition had a significantly larger mean difference than the reading *and* writing condition, indicating that participants retained less incidental vocabulary acquisition with the reading condition than with the reading *and* writing condition. There was not a statistically significant difference ($p = .566$) between the reading *and* writing condition and the writing condition on incidental vocabulary acquisition.

Table 46 presents the mean differences between conditions on MC1 and MC2. Table 47 presents the mixed-effects analysis of the retention of incidental vocabulary acquisition on the multiple-choice measure.

Table 46

Mean Differences for Incidental Vocabulary Acquisition Retention on Multiple-Choice Measure

Condition	MC1 Mean	MC2 Mean	MC Mean Difference	*SD*
Reading	7.40	4.37	-3.03	1.854
Writing	7.88	5.83	-2.05	1.500
Reading & Writing	7.86	5.63	-2.23	1.739

Table 47

Mixed-Effects Analysis of Incidental Vocabulary Acquisition Retention on Multiple-Choice Measure

Parameter	Estimate	*SE*	*df*	*t*	*p*
Intercept	7.596	.061	769.573	123.828	.000
Reading	-0.560	.070	788.775	-7.925	.000
Writing	.039	.069	788.026	.575	.566
Reading & Writing	0	0			

Incidental vocabulary acquisition retention as measured by VKS measure. A two level mixed-effect model was used to evaluate the retention of incidental vocabulary acquisition based on the three instructional conditions as measured by the differences between VKS1 and VKS2 measures. The model equation was:

$$\text{VKS Retention} = \beta_{00} + \beta_{01i} * \text{Condition}_{ti} + \beta_{02} * \text{Mean difference}_{ti} + \lambda_{01} * \text{Mean difference}_{ti} + u_{0i} + e_{ti}$$

Table 48 presents the mean differences between conditions on VSK1 and VKS2. Table 49 presents the mixed-effects analysis of the retention of incidental vocabulary acquisition on the VKS measure.

Table 48

Mean Differences for Incidental Vocabulary Acquisition Retention on VKS Measure

Condition	VKS1 Mean	VKS2 Mean	VKS Mean Difference	*SD*
Reading	15.70	15.83	.13	2.052
Writing	16.52	16.35	-0.17	3.343
Reading & Writing	17.27	17.10	-0.17	3.105

Table 49

Mixed-Effects Analysis of Incidental Vocabulary Acquisition Retention on VKS Measure

Parameter	Estimate	*SE*	*df*	*t*	*p*
Intercept	17.183	.215	788.011	79.637	.000
Reading	-1.418	.305	788.018	-4.647	.000
Writing	-0.749	.304	788.000	-2.456	.014
Reading & Writing	0	0			

Results of the mixed-effects model indicated significant differences between the retention of incidental vocabulary based on the three instructional conditions on the VKS measure, $F(2, 788) = 10.807$, $p < .001$. The reading condition had a significantly larger mean difference than the reading *and* writing condition, indicating that participants retained less incidental vocabulary acquisition with the reading condition than with the reading *and* writing condition on the VKS. The participant scores on the reading *and* writing condition had a smaller mean difference than the scores on writing condition indicating that more incidental vocabulary acquisition was retained in the reading *and* writing condition than the writing condition ($p = .014$).

For Question 2 of this study, results indicate for retention of incidental vocabulary acquisition, the means of the three instructional conditions had some significant

differences. The reading *and* writing condition mostly produced the highest acquisition scores, while the reading condition mostly produced the lowest acquisition scores. Table 50 presents the order of effects of each of the measures for the three conditions.

Question 3

Question 3 of this study was: For L1 eighth-grade students, what is the relationship between students' overall vocabulary size, reading proficiency, and incidental vocabulary gains? Two explanatory variables were used to evaluate the relationship between overall vocabulary size (VST), reading proficiency (SAGE), and incidental vocabulary gains.

Impact of vocabulary size on incidental vocabulary acquisition. A two level mixed-effect regression analysis was used to evaluate the relationship of vocabulary level (VST, Nation & Beglar, 2007) on incidental vocabulary gains for the multiple-choice measures. Results of the analysis indicated that vocabulary size accounted for a significant amount of the variability of incidental vocabulary acquisition as measured by the multiple choice tests, $F(1, 260) = 14.882$, $p = .000$, with an R^2 of 0.103. Participants'

Table 50

Incidental Vocabulary Acquisition Measures and Order of Effect

	Order of effect	
Measure	Immediate IVA	Retention IVA
WRT	RW = W = R	-----
MC1	RW = W > R	RW = W > R
VKS1	RW > W > R	RW > W > R

Note. RW = reading *and* writing, W = writing, R = reading. IVA = Incidental vocabulary acquisition.

scores on MC2 are equal to -0.532 + .311 (MC1) + .029 (VST). Participants' scores on MC2 increased .311 points for every point on MC1 and increased .029 for every point scored on VST. Both MC1 (p = .001) and VST (p = .000) were significant predictors of MC2 scores. These results suggest that participants with larger vocabularies had higher incidental vocabulary acquisition scores on the multiple choice measures used in this study. The results of the analysis are shown on Table 51.

A two level mixed-effect regression analysis was also used to evaluate the relationship of vocabulary level (VST, Nation, 2007) on incidental vocabulary gains for the VKS measures. Results of this analysis indicated that vocabulary size also accounted for a significant amount of the variability of IVA as measured by the VKS tests [F(2, 260) = 311.429, p = .000] with an R^2 of .706. Participants' scores on VKS2 are equal to 1.937 + .782 (VKS1) + .018 (VST). Participants' scores on VKS2 increased .782 points for every point on VKS1 and increased .018 for every point scored on VST. Both VKS1 (p = .000) and VST (p = .043) were significant predictors of VKS2 scores, indicating that overall vocabulary size had a positive impact on incidental vocabulary gains as measured by VKS. The results of the analysis are shown on Table 52.

Table 51

Multiple Regression Analysis of VST on MC2

Variable	*b*	*SE*	*B*	*t*	*p*
Intercept	-0.532	.911	--	-0.584	.560
MC1	.311	.091	.201	3.398	.001
VST	.029	.008	.224	3.774	.000

Table 52

Multiple Regression Analysis of VST on VKS

Variable	*b*	*SE*	*B*	*t*	*p*
Intercept	1.937	.893	--	2.169	.031
VKS1	.782	.032	.828	24.382	.000
VST	.018	.009	.069	2.029	.043

Impact of reading proficiency on incidental vocabulary acquisition. A two level mixed-effect regression analysis was used to evaluate the relationship of reading proficiency (SAGE) on incidental vocabulary gains for the multiple-choice measures. Results of the analysis indicated that reading proficiency accounted for a significant amount of the variability of incidental vocabulary acquisition as measured by the multiple choice tests, $F(1, 244) = 19.209$, $p = .000$, with an R^2 of 0.136. Participants' scores on MC2 are equal to -0.627 + .321 (MC1) + .006 (SAGE). Participants' scores on MC2 increased .321 points for every point on MC1 and increased .006 for every point scored on SAGE. Both MC1 ($p = .001$) and SAGE ($p = .000$) were significant predictors of MC2 scores. These results suggest that participants with greater reading proficiency had higher incidental vocabulary acquisition scores on the multiple choice measures used in this study. The results of the analysis are shown on Table 53.

A two level mixed-effect regression analysis was also used to evaluate the relationship of reading proficiency (SAGE) on incidental vocabulary gains for the VKS measures. Results of this analysis indicated that reading proficiency also accounted for a significant amount of the variability of incidental vocabulary acquisition as measured by the VKS tests, $F(1, 244) = 319.361$, $p = .000$, with an R^2 of .724. Participants' scores on

Table 53

Multiple regression analysis of SAGE on MC

Variable	*b*	*SE*	*B*	*t*	*p*
Intercept	-0.627	.850	--	-0.737	.462
MC1	.321	.093	.208	3.473	.001
SAGE	.006	.001	.284	4.745	.000

VKS2 are equal to 2.060 + .790 (VKS1) + .003 (SAGE). Participants' scores on VKS2 increased .790 points for every point on VKS1 and increased .003 for every point scored on SAGE. Both VKS1 (p = .000) and SAGE (p = .034) were significant predictors of VKS2 scores, indicating that participants' reading level had a positive impact on incidental vocabulary gains as measured by VKS. The results of the analysis are shown on Table 54.

Due to significant correlation between VST and SAGE, both measures were not included in the same mode at the same time. Doing so would have masked the influence of measures. For question 3 of this study, results indicate that overall vocabulary size of participants had a significant positive impact on incidental vocabulary acquisition. Additionally, the reading proficiency of participants had a significant positive impact on incidental vocabulary acquisition.

Conclusion

The purpose of this study was to better understand the effect of three instructional conditions on incidental vocabulary acquisition for L1 eighth-grade students. Hypothesis

Table 54

Multiple regression analysis of SAGE on VKS

Variable	*b*	*SE*	*B*	*t*	*p*
Intercept	2.060	.790	--	6.516	.010
VKS1	.790	.032	.843	24.985	.000
VST	.003	.001	.072	2.136	.034

tests were conducted to examine the effects of three instructional conditions on incidental vocabulary acquisition and retention and to examine the influence of vocabulary level and reading proficiency on incidental vocabulary acquisition and retention. The models showed statistically significant differences between instructional conditions on incidental vocabulary acquisition. The results support the modified ILH theory as used in this study and the inclusion of a writing component for L1 eighth-grade students for increased incidental vocabulary acquisition.

CHAPTER V

DISCUSSION OF RESULTS, LIMITATIONS, AND FUTURE RESEARCH

The purpose of this study has been to evaluate how the instructional conditions of reading, writing, and reading *and* writing impact incidental vocabulary acquisition and retention for eighth-grade L1 students. Furthermore, this study explored how overall vocabulary size and reading proficiency affected incidental vocabulary acquisition. Data were collected from L1 eighth-grade participants from measures administered immediately after participants completed the three conditions to provide data on incidental vocabulary acquisition (WRT, MC1, VKS1). Measures were also administered two weeks after the completion of conditions to provide data on the retention of incidental vocabulary acquisition (MC2, VKS2). The data were analyzed using two level mixed-effects models. Finally, a measure of participants' overall vocabulary size (VST) and a measure of participants' reading proficiency (SAGE) provided additional data to evaluate the impact of overall vocabulary size and reading proficiency on incidental vocabulary acquisition gains. In this section, the results of this study will be discussed and compared to previous research about incidental vocabulary acquisition. Furthermore, the limitations of this study and considerations for future research will be discussed.

Question 1: Incidental Vocabulary Acquisition

The focus of the first research question addressed the effect of instructional condition (reading, writing, and reading *and* writing) on incidental vocabulary acquisition. Based on the framework of the Involvement Load Hypothesis (ILH), it was

hypothesized that the reading *and* writing condition would have the highest acquisition gains of incidental vocabulary acquisition, and the reading condition would have the lowest gains. The null hypothesis stated that there would be no difference of acquisition scores between the three instructional conditions. The null hypothesis was rejected for this question; there were statistically significant differences of initial incidental vocabulary acquisition between the three instructional conditions. Thus, the hypothesis of this study was supported.

In the current study, three measures (WRT, MC1, VKS1) were used to analyze the impact of the three instructional conditions on incidental vocabulary acquisition. The data from these measures captured differing levels of word knowledge. Participants were able to exhibit their basic recognition of the pseudowords on the WRT (Waring & Takaki, 2003) by marking on a list which words they remembered seeing in the instructional condition. With the MC1, participants were able to demonstrate a deeper knowledge of the word by selecting the correct meaning from five choices. On the VKS1, participants indicated the level (1-5) of knowledge they had of a word; at the highest level, participants were able to use the pseudowords correctly in sentences.

On the WRT, most basic measure of incidental vocabulary acquisition in this study, the scores on the reading *and* writing condition (M = 12.53, SD = .846) were slightly higher than the writing condition (M = 12.47, SD = .944); the scores of the writing condition were slightly higher than the reading condition (M = 12.11, SD = 1.099). However, these differences were not statistically significant. It is interesting to note that even though there was not a significant difference between the scores of the

three conditions on the WRT, that the scores from all three conditions were relatively high. This data from WRT indicates that L1 eighth-grade students were able to recognize new words after completing all three conditions, gaining at least a basic level of incidental vocabulary acquisition. It should also be noted that there was ceiling effect on this measure for all three conditions, which may potential mask differences in incidental vocabulary acquisition between the instructional conditions.

A deeper level of participants' knowledge of the pseudowords was assessed by the MC1. Results of the analysis for this measure showed there was a significant difference for incidental vocabulary acquisition between the three conditions, $F(2, 789) = 27.464$, $p < .001$. Participants had statistically significant ($p < .001$) higher levels of incidental vocabulary acquisition for the instructional conditions of reading *and* writing and writing conditions than for the reading condition. According to the model, the average participant scored .433 fewer points on the MC1 on the reading condition than the reading *and* writing condition. There was no statistically significant difference in incidental vocabulary acquisition as measured by MC1 between the reading *and* writing and the writing conditions ($p = .783$). It should also be noted that there was ceiling effect on the MC1 measure for all three conditions, which may potentially mask differences in incidental vocabulary acquisition between the instructional conditions. Results of this study indicate that L1 eighth-grade students acquired more incidental vocabulary through the higher involvement load tasks of reading *and* writing or writing than through reading alone.

On the other measure of initial incidental vocabulary acquisition (VKS1),

participants were able to rate their level of word knowledge. The results of the VKS1 indicated that there were statistically significant differences between the conditions, $F(2, 789) = 11.182$, $p < .001$. The reading *and* writing condition had the highest involvement load and highest scores of incidental vocabulary acquisition. Participants had statistically significant higher levels of incidental vocabulary acquisition for the instructional condition of reading *and* writing ($p = .025$) than the writing condition. According to the model, the average participant scored .749 fewer points on the VKS1 for the writing condition than the reading *and* writing condition. Participants also had statistically higher levels of incidental vocabulary acquisition for the instructional condition of reading *and* writing ($p < .001$) than the reading condition. According to the model, the average participant scored 1.577 fewer points on the VKS1 for the reading condition than the reading *and* writing condition. As was expected, participants' scores on the condition with the lowest involvement load (reading) were the lowest.

Previous research on incidental vocabulary acquisition through the instructional conditions of reading, writing, and reading *and* writing with L1 middle school students has been scarce. However, some research with L2 students has reported that an increased task load results in increased initial vocabulary acquisition (Hulstijn & Laufer; 2001; Keating, 2008; Kim, 2008). Other research has not demonstrated this corresponding relationship (Haratmeh, 2012; Keating, 2008; Kim, 2008; Marmol & Sanchez-Lafuente, 2013; Rott et al., 2002). This current study also showed variability in regard to the relationship of task involvement load and incidental vocabulary acquisition. A possible reason for the varying results could be due to the different levels of incidental vocabulary

acquisition being measured. The results of the current study's outcome measures showed that when basic recognition of words is assessed through measures such as WRT, incidental vocabulary acquisition is generally equivalent between the three instructional conditions. When a deeper level of vocabulary knowledge is evaluated through measures such as multiple-choice assessments, there is a difference between tasks with higher involvement load conditions (such as reading *and* writing, and writing) and tasks with lower involvement load tasks (such as reading). Importantly, on the measure that reflects the deepest knowledge of the words (VKS), there was a distinction of incidental vocabulary acquisition gains of between the three instructional conditions (reading *and* writing > writing > reading). The current study noted that because the outcome measures of incidental vocabulary acquisition capture varying levels of vocabulary knowledge, the variance of outcomes is not due to involvement load, but due to the measure used. This study adds to the previous research by suggesting a reason for varying results when using ILH as study framework. Overall, the results of the current study suggest that the reading *and* writing condition promotes high incidental vocabulary acquisition words for L1 eighth-grade participants, especially on assessments that measure deeper incidental vocabulary acquisition word knowledge.

Question 2: Retention of Incidental Vocabulary Acquisition

The second research question evaluated the effect of instructional condition (reading, writing, and reading *and* writing) on the retention of incidental vocabulary acquisition. Based on the ILH framework, it was hypothesized that the reading *and*

writing condition would have the highest retention scores of incidental vocabulary acquisition, and the reading condition would have the lowest scores of retention. The null hypothesis stated that there would be no difference of retention scores between each of the three instructional conditions. The null hypothesis was rejected for this question. There were statistically significant differences of retention between the three instructional conditions. Thus, the hypothesis of this study was supported.

In the current study, two repeated measures (MC, VKS) were used to analyze the effect of the three instructional conditions on the retention of incidental vocabulary acquisition. Results of the mixed-effects model for the multiple-choice measure indicated significant differences of retention between the three instructional conditions, $F(2, 789) = 44.034$, $p < .001$. The reading *and* writing condition had a significantly ($p < .000$) smaller mean difference than the reading condition on the multiple-choice measures, indicating that participants retained more incidental vocabulary acquisition with the reading *and* writing condition than with the reading condition. There was no significant difference ($p = .566$) between participant scores on the reading *and* writing condition and the writing condition for incidental vocabulary retention. The data from these measures indicated that L1 eighth-grade students were able to retain more incidental vocabulary acquisition while completing tasks with a higher involvement load.

On the second measure of the retention of incidental vocabulary acquisition (VKS), participants rated their level of vocabulary knowledge. The results of the mixed-effect model for the VKS indicated statistically significant differences of the retention of incidental vocabulary acquisition between the three instructional conditions, $F(2, 788) =$

10.807, $p < .001$. There was a statistically significant difference in incidental vocabulary acquisition as measured by VKS between the reading *and* writing and writing condition ($p = .014$), favoring the reading *and* writing condition over the writing condition. There was also a statistically significant difference between the reading *and* writing condition and the reading condition ($p < .001$), favoring the reading *and* writing condition. As was expected, the lowest involvement load task (reading) had the lowest scores of retention of incidental vocabulary acquisition. The results of this measure suggest that participants were able to retain greater incidental vocabulary acquisition gains from completing the reading *and* writing condition, the condition with the highest involvement load.

Previous research conducted on the impact of instructional conditions on the retention of vocabulary acquisition with L1 middle school students is rare. However, previous research with L2 students has indicated that instructional conditions with higher involvement loads result in higher retention of incidental vocabulary acquisition; while tasks with the lower involvement loads, result in the lower scores (Hulstijn & Laufer, 2001; Kim, 2008; Pichette et al., 2012; Yaqubi et al., 2010). Some previous research has indicated no significant differences between a task with a medium involvement load and a task with a high involvement load (Keating, 2008; Kim, 2008; Rott et al., 2002). As was the case when discussing the acquisition of unknown words in question one, the results of this study also showed variability in retention. Results of the multiple-choice measures, showed no statistically significant difference between the scores for the reading *and* writing and writing conditions. Both the scores of the reading *and* writing condition and the writing condition were statistically significant higher than the scores on

the reading condition. On the VKS, there was a statistically significant difference between the three instructional conditions, with participants scoring higher on the reading *and* writing condition. This order of participants' scores (reading *and* writing > writing > reading) for the VKS retention measures was the same as the VKS measures of initial vocabulary acquisition, showing consistency between the VKS measures. These statistically significant differences of scores in between the reading *and* writing and writing condition for the multiple-choice and VKS measures might be due to the VKS having a wider distribution of scores, allowing this measure to better capture differences in incidental vocabulary acquisition growth and retention. Overall, the results of the current study suggest that the reading *and* writing condition promotes high retention of incidental vocabulary acquisition for L1 eighth-grade students, especially on assessments that measure deeper word knowledge.

Question 3: Relationship of Vocabulary Size and Reading Proficiency on Incidental Vocabulary Acquisition

The focus of the third research question was the relationship between participants' vocabulary size, reading proficiency, and incidental vocabulary gains. This study hypothesized that vocabulary size and reading proficiency would have a positive impact on incidental vocabulary acquisition gains. The null hypothesis stated that vocabulary size and reading proficiency would not have a significant impact on incidental vocabulary acquisition. The null hypothesis was rejected for this question; both vocabulary size and reading proficiency had a significant positive affect on incidental vocabulary acquisition

gains. Thus, the hypothesis of this study was supported.

Relationship of Incidental Vocabulary Acquisition and Overall Vocabulary Size

For the multiple-choice measures, the results of this study suggest that overall vocabulary size, as measured by VST (Nation & Beglar, 2007) has a positive impact on incidental vocabulary acquisition gains, $F(1, 260) = 14.882$, $p = .000$. For the VKS measures, the results of this study also suggest that overall vocabulary size has a positive impact on incidental vocabulary acquisition, $F(1, 260) = 311.429$, $p = .000$. The results of this study support previous findings from general studies on vocabulary acquisition that vocabulary size promotes an increase in incidental vocabulary acquisition (Anderson & Freebody, 1981; Nagy, 2005; National Reading Technical Assistance Center [NRTAC], 2010). Previous research on ILH and incidental vocabulary acquisition have neglected the effects of vocabulary size on incidental vocabulary acquisition. By adding overall vocabulary size as an explanatory variable to this study, the positive affect overall vocabulary size has on incidental vocabulary acquisition and retention for L1 eighth-grade participants has been shown. Thus, increasing incidental vocabulary acquisition through instructional conditions such as ones used in this study (writing, reading *and* writing) not only helps increase vocabulary, but also helps to build a foundation of increased incidental vocabulary acquisition for the future.

Relationship of Incidental Vocabulary Acquisition and Reading Proficiency

For the multiple-choice measures, the results of this study suggest that reading

proficiency, as measured the state-mandated English Language Arts test (SAGE), has a positive impact on incidental vocabulary acquisition gains, $F(1, 244) = 19.209$, $p = .000$. For the VKS measures, the results of this study also suggest that reading proficiency has a positive impact on incidental vocabulary acquisition, $F(1, 244) = 319.361$, $p = .000$. In previous research, reading has often been a tool used for increasing incidental vocabulary acquisition and has been not only been the most common method for learning incidental vocabulary, but has also been called the ideal tool (Ellis, 1994; Nagy & Anderson, 1984). Indeed, there is also a strong correlation between reading proficiency and vocabulary acquisition and knowledge (Laflamme, 1997; Hawkins et al., 2011; Hirsch, 2003, Stahl & Fairbanks, 1986; Nagy & Scott, 2000; Baumann et al., 2003). However, there appears to be a reciprocal relationship between incidental vocabulary acquisition and reading proficiency—the greater the vocabulary knowledge, the greater the reading proficiency. Thus, by increasing incidental vocabulary acquisition through the means of this study (namely, the reading *and* writing and writing conditions), teachers can build the reading proficiency of students.

Summary

The results of the current study indicate that the scores of L1 eighth-grade participants on initial incidental vocabulary acquisition measures (MC1, VKS1) are statistically significantly higher when completing the reading *and* writing condition than when completing the reading condition. The results of this study also indicate that scores of L1 eighth-grade participants on retention of incidental vocabulary acquisition (MC2, VKS2) are statistically significant higher when completing the reading *and* writing

condition, than when completing the reading condition. Finally, in the current study, the results showed that overall vocabulary size and reading proficiency are positive predictors of scores on the incidental vocabulary acquisition outcome measures.

Contributions to Research and Implications for Instruction

This study explored the impact of three instructional conditions (reading, writing, reading *and* writing) on incidental vocabulary acquisition. The results of this study have contributed to the research field in incidental vocabulary acquisition. Specifically, this study contributed a vetted list of pseudowords and strengthened ILH through the addition of a change of processing score.

Vetted List of Pseudowords

This study necessitated creating a list of words that would be unknown to participants. In creating this list, each pseudoword was vetted through a traditional dictionary and an online urban dictionary to make sure there were no matches to actual words with even obscure usages. Additionally, for each pseudoword, attention was given to the number of syllables, number of letters per syllable, match of phonological and orthographical patterns, and initial letter distribution. Once the 24 pseudowords were created, three word lists were created of eight words each; a unique pseudoword list was used in each of the three instructional conditions. The pseudoword lists were further checked for distribution of consonant letters and distribution of vowel patterns to ensure similarity of pseudowords within and across the three lists.

With the creation of this word list, researchers and educators who may need a list

of pseudowords in their research and practice can feel confident that the words used in this study are carefully vetted and analyzed. When examining pseudoword lists used in previous research, it was noted the pseudoword lists did not follow typical phonological and orthographical patterns or ensure comparable distribution of vowel and consonant sounds for the words. When the word lists were divided into three lists for use in studies (Brown et al., 2008), the pseudowords were not comparable in structure and type across the lists. Furthermore, when the words were cross-referenced with a traditional dictionary and the Urban Dictionary, some of the words were found to have current usage and definitions. These weaknesses in previous pseudoword lists necessitated the creation of a new pseudoword list that met these standards. This is a significant contribution of this study.

Change of Processing Score

In the current study, a change of processing category was added to the ILH; this was something that had never been done before. Typically, when using ILH, an involvement score was created using need, search, and evaluation. Each of these categories could receive a score of 0 (absent), 1 (moderate), or 2 (strong). When a learner is required to change how they are processing information during a task (e. g., changing from reading, a low level task to writing, a higher level task) the overall load of the task increases (Block et al., 2010). For this study, change of processing was added to the other three categories and could receive a score of 0 (absent) or 1 (present). The change of processing component was expected to increase the involvement load. The reading *and* writing condition (the only instructional task with the change of processing component in

this study), consistently produced the highest scores on the outcome measures.

Additionally, three instructional implications were identified by this study: the use of ILH in an English as a first language setting, the potential of incidental vocabulary acquisition with minimal exposures, and the promotion of incidental vocabulary acquisition through increasing the involvement load of tasks by including a writing component, and

ILH with English with First Language Participants

The ILH hypothesis has been used in several studies with participants who were learning a second language (Beal, 2007; Folse, 2006; Haratmeh, 2012; Hill & Laufer, 2001; Hulstijn & Laufer, 2001; Keating, 2008; Kim, 2008; Laufer, 2003; Marmol & Sanchez-Lafuente, 2013; Pichette et al., 2012; Rott et al., 2002; Yaqubi et al., 2010), but rarely in a first language setting. The results of this study show that this framework can be used to create effective strategies to help L1 middle school students gain and retain new vocabulary.

Incidental Vocabulary Acquisition with Minimal Exposures to Words

Previous research suggested that the number of exposures to unknown words could affect the success of learning them (Laflamme, 1997; Nagy et al., 1985; Nation, 2005; Pellicer-Sanchez & Schmitt, 2010; Rott, 1999; Stahl & Fairbanks, 1987). Typically, the more exposures to a word, the more likely it is to be learned (Brown et al., 2008; Daskalovska, 2014; Hulstijn et al., 1996; Laflamme, 1997). However, research has

also suggested that if an unknown word is introduced while completing a higher-level task, it can be learned with minimal exposures (de Leeuw et al., 2014; Laufer, 2003; Keating, 2008). In this study, exposure to the pseudowords was limited to two exposures. The results of this study indicated that participants were able to acquire vocabulary incidentally with minimal exposures to the pseudowords. These results help to address the call for research to evaluate if increasing the involvement load of a task can promote incidental vocabulary acquisition of unknown words with minimal exposures (de Leeuw et al., 2014).

Incidental Vocabulary Acquisition by Increasing the Involvement Load Through Writing Tasks

Hulstijn and Laufer (2001) and Kim (2008) described three components to ILH: *need* (motivation), *search* (action of looking up words), and *evaluation* (making decisions about words). Each of these components are given a score (0 = absent, 1 = moderate, 2 = strong) for a given task. The scores are then summed to create an involvement load score for the task. This scoring system supports the basic tenet of the ILH that the more cognitive load an instructional task requires; the more likely incidental vocabulary acquisition will occur. The three instructional conditions in this study had varied involvement loads. The reading condition had an involvement load score of 1 (*Need* = 1, *Search*, = 0, *Evaluation* = 0, *Change of Processing* = 0). The writing condition had an involvement load score of 3 (*Need* = 1, *Search* = 0, *Evaluation* = 2, *Change of Processing* = 0). The reading *and* writing condition had an involvement load score of 4 (*Need* = 1, *Search* = 0, *Evaluation* = 2, *Change of Processing* = 1). The reading *and* writing

condition had the highest involvement load score and the expectation of this study was that the reading *and* writing condition which would produce the greatest gains of incidental vocabulary acquisition and retention.

On the multiple-choice measures (MC1 and MC2), participant incidental vocabulary acquisition scores for the reading *and* writing condition and writing were significantly higher than incidental vocabulary acquisition scores on the reading condition. However, the MC1 results were not normally distributed; thus, caution is needed when interpreting the results of the MC1 measure. On the Vocabulary Knowledge Scale measures (VKS1 and VKS2), participant incidental vocabulary acquisition scores for the reading *and* writing condition had significantly higher scores than the writing and reading conditions. It was apparent that increasing the involvement load positively impacted the amount of incidental vocabulary acquired and retained. The results of this study indicate that incorporating writing tasks as part of a reading task can increase incidental vocabulary acquisition for L1 eighth-grade participants. In the current study, participants used writing in two of the conditions (writing, reading *and* writing). The same results were shown on the measures of retention of incidental vocabulary acquisition (MC2, VKS2), where the scores on the reading *and* writing and writing conditions both had higher scores. It is clear from the results of this study that that when planning vocabulary acquisition tasks for L1 middle school students, it is good practice to include a writing component.

Summary

The results from the current study indicated several implications. First, this study

necessitated the creation of a new pseudoword list that met the criteria of word structure, comparable words across all three conditions, and no previous usage or meaning. Second, this study presented a case for incidental vocabulary acquisition when unknown words are learned during tasks with higher involvement loads. Third, despite the previous research that almost exclusively used second language learners with ILH, the results of this study indicate that L1 participants can benefit from the ILH. Fourth, it is quite clear the results of the current study and previous research that increasing the involvement load by adding writing to reading tasks does promote an increase of incidental vocabulary acquisition. Finally, another way to increase the involvement load of a task and increase incidental vocabulary acquisition is to add a change of processing to the task.

Limitations and Future Research

There were four limitations this study that could be considered for future research about incidental vocabulary acquisition: the length of time between immediate and delayed measures, the ceiling effect of some measures, the incidental nature of the study, and the writing tasks.

The Length of Time between Immediate and Delayed Measures

The first limitation was the length of time between the immediate measures (MC1 & VKS1) and the delayed measures (MC2 & VKS2). The amount of time between the measures in this study (2 weeks) is a relatively brief period of time to fully capture participants' retention of newly acquired vocabulary. Two weeks was chosen for this

study because it allowed the research to be completed in a timely matter before other events (i.e., mandated testing, participant schedule changes, and term changes) could impact the study. In future studies, a longer delay could be implemented to determine the potential impact on incidental vocabulary retention.

Ceiling Effect for Some Measures

A second limitation of this study was the ceiling effect on some measures. When analyzing the data, it was found that two of the assessments (WRT and MC1) had data that was highly skewed due to a ceiling effect. Because of the ceiling effect, only the descriptive data was reported for the WRT measure. For the MC1 measure, the data was included in the mixed-effects models. Due to the non-normality of the data, results should be interpreted with caution. In researching the WRT assessment, the previous research did not state that a ceiling effect was possible or likely and assumptions of normality were not reported (Doughterty-Stahl, 2010; Waring & Takaki, 2003). Although, a study conducted by Rott et al. (2002) mentioned the use of non-parametric analysis due to non-normal distribution; the reason for a non-normal distribution was not discussed. Future studies should consider possible ways to address this limitation of the WRT. The data could then be added to the mixed-effect model analysis, which could give a stronger analysis to the results of the study. Future research could also increase the number of multiple-choice questions for each pseudoword; the amount of questions could help to create a normalized distribution for the MC1, adding strength to the model.

Incidental Nature of the Study

A third limitation of study was the possibility of participants realizing the research was focused on vocabulary, thereby, making the vocabulary acquisition intentional instead of incidental. However, the study was planned carefully to promote incidental vocabulary acquisition for each of the three conditions. The instructions for each measure were worded carefully to limit the possibility of participants focusing on the vocabulary aspect of this study. Care was taken throughout the study to protect the incidental nature of the study.

The Writing Tasks

Finally, there were two writing tasks in this study. In the writing condition, participants wrote complete sentences with the pseudowords. In the reading *and* writing condition, participants wrote a summary of a story, using the pseudowords presented in the story. It is possible the type of writing task could have impacted the results of the study. Future research could be conducted to determine if different writing tasks have a significant impact on incidental vocabulary acquisition, and which types of writing have the strongest impact on incidental vocabulary acquisition for L1 middle school students.

Summary

The limitations of this study show the need for further studies. First, future research could explore the impact of longer delay times between measures. Second, future studies could develop and improve the output measures to alleviate the ceiling effect seen in some of the data in the current study. Third, measures could be introduced

that could assess whether the tasks were incidental in nature. Fourth, more research should be conducted concerning the viability of ILH, particularly with L1 middle school participants. Finally, the strengths and weaknesses of different writing tasks and their impact on incidental vocabulary acquisition should be evaluated.

Conclusion

Research has shown that middle school students with an extensive vocabulary have an increased chance of academic success (Antonacci & O'Callaghan, 2012; Becker, 1977; Biemiller, 1999; Carleton & Marzano, 2010; Kelley et al., 2010). Hence, the task of helping students acquire vocabulary is an important responsibility for middle school teachers. By implementing effective vocabulary instruction, especially when combined with other tasks such as reading and writing, it is possible for students to increase their vocabulary incidentally.

Previous research conducted on incidental vocabulary acquisition pointed to ILH as a possible effective framework for vocabulary acquisition. In this study and within the ILH framework, three instructional conditions with different involvement loads were given to participants. Assessments were administered to evaluate the impact of the three instructional conditions on incidental vocabulary acquisition and retention. While previous research was found to support ILH, there was also research that showed that just because a task has a higher involvement load, it does not necessarily equate to greater gains and retention of incidental vocabulary acquisition (Haratmeh, 2012; Keating, 2008; Kim, 2008; Marmol & Sanchez-Lafuente, 2013; Rott et al., 2002).

This current study extended the support of using conditions with an increased load to help facilitate incidental vocabulary acquisition and retention with L1 eighth-grade students. It was clear that including a writing component to reading—thereby increasing the involvement load—resulted in more initial incidental vocabulary acquisition gains and more retention of incidental vocabulary acquisition among L1 eighth-grade participants. Additionally, it was clear that participants' scores on the reading *and* writing condition (the condition with the highest involvement load) were consistently high. Finally, the data from this study supported previous research in showing that participants' overall vocabulary and reading proficiency have significant, positive impacts on incidental vocabulary acquisition gains.

In the current study, the scores on the writing and the reading *and* writing conditions were consistently higher on the outcome measures than the reading condition. The writing condition had an involvement load score of 3 compared to the reading which had an involvement load score of 1. From the results of this study, it is apparent that including writing (i.e., writing sentences or short paragraphs that include unknown words found in texts) is more effective than having students focus on reading alone for incidental vocabulary acquisition. Furthermore, the reading *and* writing condition had a higher involvement load score than the writing condition because of the addition of the change of processing component. The results of this study indicate that a change of processing from a lower level skill (i.e., reading) to a higher-level load (i.e., writing) can further increase the incidental vocabulary acquisition of L1 eighth-grade students. Instead of students just relying on glosses or discovering meaning from context clues, a more

effective strategy would ask students to be exposed to unknown words through reading a text, and then students would write the unknown words they encounter in a sentence or short summary.

Overall, the results of this study suggest that increasing the involvement load on vocabulary tasks by adding a writing component, will help middle school students increase their ability to acquire vocabulary incidentally more than just reading alone. This increase in vocabulary is needed for students to improve language skills, support reading comprehension, advance writing abilities, and increase motivation to be academically successful (Kelley et al., 2010; Lesaux, Harris, & Stone, 2012; Vaughn et al., 2013).

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EDUCATION

B.S. in English Education, Utah Valley University, Orem, UT (4/2007).
M.Ed. in Curriculum & Instruction. Utah Valley University, Orem, UT (4/2011)
Ph.D. in Instructional Leadership. Utah State University, Logan, UT (4/2017).

EXPERIENCE

Online Adjunct Instructor: BYU-Idaho, Rexburg, ID. Jan. 2015-Present.
Basic Writing Skills
Basic Writing Skill (ESL)

Teacher: Canyon View Junior High, Orem, UT. August, 2007-Present.
8th and 9th grade English Language Arts and special education co-taught.
Creative writing and reading skills classes.
Represented CVJH at meetings with district superintendent.
Created and ran a credit recovery program for 9th grade English Language Arts
Organized and ran 9th grade field trip.

Teacher: West Hills Middle School, West Jordan, UT. March 2007-June 2007.
7th grade English Language Arts and reading.

PUBLICATIONS AND PRESENTATIONS

Lee, D. B. (2011). *The Effects of Self-Assessment on Student Perceptions of Motivation and Learning.* (Unpublished master's project). Utah Valley University, Orem, UT.

Lee, D.B. (2013). Increasing student engagement, decreasing teacher workload: Student self-assessment as a writing approach. *Utah English Journal, 41*, 17-21.

Lee, D. B. (2013). *Student self-assessment as a writing strategy: How to grade less and have students write more.* Conference Presentation at Utah Council of Teachers of English, Salt Lake City, UT.

Lee, D. B. & Jones, C. D. (2016). *The impact of writing on incidental vocabulary acquisition for middle school students.* Roundtable presentation at Association of Literacy Educators and Researchers, Mrytle Beach, SC.