

BUILDING A CORPUS-BASED INSTRUCTIONAL VOCABULARY
MODEL: INTERDISCIPLINARY ACADEMIC WORDS IN
UNIVERSITY READING SUPPORT COURSES

by

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Soli Deo honor et gloria!

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ABSTRACT

While research demonstrates the importance of vocabulary knowledge for reading comprehension (Anderson & Freebody, 1981; Guo, Roehrig, & Williams, 2011), many studies suggest wide reading exposure for vocabulary acquisition (Nagy, Herman, & Anderson, 1985; Stahl & Nagy, 2006). However, there is compelling evidence for the benefits of direct vocabulary instruction (Elleman, Lindo, Morphy, & Compton, 2009; Laufer & Rozovski-Roitblat, 2015).

Due to the volume of vocabulary acquisition that is needed, time considerations and subjectivity can make instructional vocabulary selection seem futile. To overcome these issues, the use of corpora has enhanced the possibilities of identifying high-frequency lexical items in a systematic and more objective manner. Drawing on insights from multiple disciplines, this dissertation adopts a corpus-based approach for the selection and teaching of high-frequency interdisciplinary academic vocabulary in a model that accommodates the needs of students in university reading support courses.

The adopted corpus-based model identifies instructional vocabulary with the support of the Word and Phrase Tool (Davies, 2013), a Web interface that allows users to scan texts in order to gain instructional information about their lexical profiles.

Considering academic vocabulary to be an interrelated feature of academic language, the dissertation shows how a well-designed empirical selection process can advance the capabilities of instructors in ways that address some valid concerns of earlier word list approaches.

The instructional portion of the model is organized around a researcher-developed method called *item discussions* that uses a graphic organizer for students to record vocabulary explorations that are attentive to known aspects of vocabulary development such as definition, morphology, and synonymy and, additionally, to generate sentences using each term in a context similar to that in which it was encountered.

To further investigate the effectiveness of this corpus-based instructional model, a preliminary small-scale experimental study was conducted with students enrolled in two reading support classes at a large university ($N = 18$). Moderate to strong effect sizes were found for similar-to-instructional context encounters ($g = .73$) and the full instructional model ($g = .95$), suggesting that the model offers a promising approach. The discussion includes pedagogical implications and further directions for research and implementation.

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CHAPTER ONE: CONTEXT AND PURPOSE OF THE STUDY

The 2013 National Assessment of Educational Progress (NAEP) results for each tested grade level demonstrated that students with lower comprehension scores also had lower vocabulary scores and the average vocabulary score for twelfth graders was under the set level for proficiency (U.S. Department of Education). Partially as a result of under-preparation in K-12, universities implement means of supporting students who are not ready for college-level reading.

Context of the Present Study: University Reading Support Classes

Reading support courses (sometimes labeled *developmental*) are designed to equip students with skills deemed necessary for college success. The US Department of Education's most recent published information (Chen, 2016) reports that 39.6% of students entering four-year higher educational institutions in the United States took at least one developmental education course, and 10.8% took a developmental English or reading course.

The model presented in this dissertation targets instruction in reading support courses at Middle Tennessee State University (MTSU), though the findings can be generalized to other university prescribed reading support courses. MTSU adopted a co-requisite model to replace the traditional format of remedial education as a part of a system-wide plan put in place by the Tennessee Board of Regents (TBR), a state higher education system in which MTSU, at the time, participated (Denley, n.d.). The reading support courses at MTSU are linked with required history courses. This design facilitates

the teaching of literacy skills in the context of assigned materials from a course that meets a general education requirement.

Reading support courses are currently prescribed for students at MTSU based on ACT reading scores and GPA. As the coordinator of reading support classes, I helped to set the current policy for course prescription. Presently, a student with a score of 17 or 18 will be placed in READ 1000 (reading support) if the individual's high school GPA is less than 3.25. A student is placed in READ 1000 regardless of GPA with a reading ACT reading score of 16 or below. International students who have not taken the ACT are placed, by university policy, based on ACCUPLACER test results. Based on my experience, reading support courses are typically composed of racially and ethnically diverse populations of students with differing levels of experience with the English language.

The reading support courses' focal approach can be termed *content literacy* based on Shanahan and Shanahan's (2012) comparison of this approach with disciplinary literacy. According to Shanahan and Shanahan, disciplinary literacy focuses on specific vocabularies and text structures within particular disciplines whereas content literacy focuses on strategies that can be generalized to other disciplines. The primary focus in reading support courses is on fundamental, transferable, skills such as identifying main ideas, summarizing passages, finding themes, connecting texts with schemata, and metacognition. Because understanding text genre and the context of a discipline in which one is reading are very important for comprehension, disciplinary literacies are also

taught. In the context of analyzing particular texts, the overlap between approaches is often seamless.

Targeted lexical items examined in reading support courses have often been part of discipline-specific vocabularies that pertain to the thematic topics of the assigned history texts. Since a desired outcome of the reading support courses is to equip students for successful reading comprehension across disciplines, there has been a need for a broader approach to academic vocabulary instruction. However, it has been challenging to find a helpful model to systematically provide such instruction. One hindrance has been instructional time allotment. As Willingham and Price (2009) pointed out, it is difficult for developmental educators to find adequate time to include vocabulary instruction in course curriculum.

Some researchers have recommended vocabulary instructional strategies for college reading support courses. Suggested methods have included consideration of academic language structures (Neal, 2015), student-directed discussion groups that focus on word encounters (Willingham & Price, 2009), and instruction in strategies that students can use to continually build vocabulary, such as employment of contextual clues, dictionary use, and consideration of morphology (Simpson, Stahl, & Francis, 2004). However, apart from studies targeting non-native speakers of English, the existing literature for vocabulary instruction in university settings is sparse. The present study began with a search for a comprehensive research-based means of selecting and teaching high-frequency academic vocabulary in the context of university reading support classes.

Purpose and Significance of this Study

The goal of this dissertation is to present an empirical corpus-based model of selection and instruction of high-frequency interdisciplinary academic vocabulary in the context of prescribed university reading support courses. As will be discussed, corpora can be used effectively as an integral part of an instructional model, and a Web-based corpus tool (Word and Phrase Tool, Davies, 2013) can be used to give instructors access to valuable information from corpora regarding individual items. The present model involves methods of selection and instruction that are theoretically sound as well as pedagogically practical. A related small-scale preliminary study explores the effects of the proposed model on student acquisition of vocabulary.

CHAPTER TWO: LITERATURE REVIEW: VOCABULARY, READING COMPREHENSION, AND INSTRUCTION

In this chapter, I present research that provides evidence supporting the connection between vocabulary knowledge and reading comprehension along with theories that have been proposed relating to how this relationship functions. I then discuss what is known from research related to the effectiveness of vocabulary instruction. The Lexical Quality Hypothesis (LQH; Perfetti, 2007) postulates that there are varying strengths of mental word representation. I explain this hypothesis as well as the separate, though connected, construct of vocabulary depth and discuss how these concepts connect to reading comprehension and instruction.

The Relationship Between Vocabulary and Comprehension

There is an intuitive connection between vocabulary knowledge and reading comprehension—words are the building blocks of texts. However, the nature of the relationship is complex, as both vocabulary knowledge and reading comprehension are influenced by several other factors (Snow, 2002), and the way that they are related is not fully understood (Kamil, 2004). Still, the strong relationship between vocabulary and reading comprehension has been long established in research (Anderson & Freebody, 1981; Thorndike, 1973).

General vocabulary and reading comprehension. General vocabulary knowledge as measured by standardized assessments has been found to be positively correlated with reading comprehension in studies representing diverse populations including adolescents with academic struggles ($r = .54$; van Steensel, Oostdam, van

Gelderen, & van Schooten, 2016), adolescent non-native speakers of English ($r_s = .83$; Stæhr, 2008), and children (vocabulary accounted for 28.5% of reading comprehension; Ouellette, 2006).

While studies targeting various populations are helpful in establishing a general connection between reading comprehension and vocabulary, it is possible that this relationship changes through stages of development. Nouwens, Groen, Kleemans, and Verhoeven (2018), conducting a longitudinal study of Dutch children beginning at the fourth grade year, found that while fourth grade vocabulary did not contribute significantly to fifth grade reading comprehension, it did contribute to fifth grade vocabulary ($r^2 = .36$). The study also found that fifth grade vocabulary contributed significantly to sixth grade reading comprehension ($r^2 = .19$). Nouwens et al. contextualized these findings within the established theory that vocabulary becomes more important to reading comprehension as children develop toward automaticity in reading—the automatic recognition of word representations (Catts, Hogan, & Adlof, 2005; Verhoeven & van Leeuwen, 2008).

The possibility of a changing relationship between comprehension and vocabulary would suggest that findings related to university students may be dissimilar to younger populations. Guo, Roehrig, and Williams (2011), however, found results that paralleled research with other populations when they conducted a study with 151 adult undergraduate and graduate university students. These researchers found that beyond indirect effects via morphological and syntactic awareness, vocabulary knowledge had significant effects on reading comprehension.

Text comprehension based on known items within the text. Knowledge of lexical items in specific passages is important for the comprehension of those texts, as is demonstrated by findings in research related to lexical coverage. Lexical coverage refers to the percentage of lexical items known to a reader in a given text (Szudarski, 2018; van Zeeland & Schmitt, 2013). Researchers have suggested that 95-98% lexical coverage is required for adequate comprehension (Hu & Nation, 2000; Laufer, 1989; van Zeeland & Schmitt, 2013). Lexical coverage has particularly been of interest to researchers studying non-native language acquisition. Conducting a study among non-native speakers of English, AlTameemy, Daradkeh, and Alhamod (2018) found a strong and significant correlation between reader knowledge of terms used in specific texts and comprehension of those texts ($r = .702$). In a similar study, Schmitt, Jiang, and Grabe (2011) found a linear relationship between lexical coverage and comprehension ($r_2 = .407$). In this research, 95% coverage was correlated with 60% comprehension and 98% coverage was correlated with 70% comprehension.

Similar to the possibility mentioned regarding general vocabulary knowledge and reading comprehension, it may be the case that the relationship between text comprehension and knowledge of specific items within a text is different for American university students than other populations. Yet, Turner and Williams (2007) conducted a study among 418 undergraduate students taking human development courses in a teacher education program in the United States. They used multiple choice vocabulary assessments of words embedded in course exams as well as other tests measuring prior knowledge of course topics. The researchers found vocabulary knowledge to be the best predictor of course exam scores. Though Turner and Williams' study did not measure

lexical coverage, it demonstrated a similar concept—knowledge of specific lexical items is related to comprehension of texts in which those items are found.

Nature and direction of the relationship between vocabulary and reading comprehension. Researchers have suggested six hypotheses to attempt to explain the relationship between vocabulary and reading comprehension (Harmon & Wood, 2018). Of these, the hypotheses that are most supportive of the potential benefits of vocabulary instruction on reading comprehension are the instrumental hypothesis, which postulates that understanding word meanings directly affects comprehension (Anderson & Freebody, 1981; Harmon & Wood) and the access hypothesis, which holds that automaticity in accessing word meanings is necessary for comprehension (Mezynski, 1983). The reciprocal hypothesis highlights the interconnected nature of reading comprehension and vocabulary, claiming that each is beneficial to the other (Stanovich, 1986).

Theories less supportive of word knowledge directly affecting reading comprehension include the knowledge and aptitude hypotheses, which each suggest that there are preceding factors that influence vocabulary and comprehension—respectively, background knowledge and verbal ability (Anderson & Freebody, 1981; Harmon & Wood, 2018). The metalinguistic hypothesis, which explains an aspect of aptitude, would support vocabulary instruction that is particularly focused on depth, as this theory proposes that the ability to make inferences about word meanings affects reading comprehension (Harmon & Wood, 2018; Stahl & Nagy, 2006). As Elleman, Lindo, Morphy, and Compton (2009) and Harmon and Wood pointed out, these theories are not

mutually exclusive and may all explain part of the complex relationship between vocabulary and reading comprehension.

There is some empirical evidence for a causal relationship wherein vocabulary affects reading comprehension. Quinn, Wagner, Petscher, and Lopez (2015) collected data from a longitudinal study involving elementary students to examine developmental relationships between vocabulary knowledge and reading comprehension. Quinn et al. used a bivariate dual change score model that demonstrated the positive correlation over time between reading comprehension growth and vocabulary development. Turning, then, to models nested within the bidirectional model, the researchers found that the scenario representing one direction, where vocabulary growth preceded reading comprehension growth, did not significantly reduce the fit of the model whereas a scenario that only accounted for reading comprehension preceding vocabulary growth did (Quinn et al.). These results were consistent with a previous study conducted by Reynolds and Turek (2012), who also found a unidirectional relationship between vocabulary and comprehension, though the latter study was interested in crystallized forms of intelligence, of which vocabulary measurements are only a part. Establishing a causal relationship would strengthen the case for vocabulary instruction.

Effects of Vocabulary Instruction on Reading Comprehension

Prior to suggesting any methods for teaching vocabulary, it is imperative to establish what is known in regard to the general effectiveness of vocabulary instruction. The National Reading Panel (NRP; 2000) reviewed the literature then available related to kindergarten through twelfth-grade vocabulary instruction and found support to include

vocabulary development as one of the five essential components of reading instruction. While the report indicates that supporting empirical evidence at the time was not robust, further developments in research reinforce the NRP's recommendation.

Conducting a meta-analysis, Elleman et al. (2009) found that vocabulary was important to text comprehension for kindergarten through twelfth-grade students, particularly as measured by researcher-designed instruments. Most of these assessments in Elleman et al.'s meta-analysis contained instructional vocabulary, demonstrating a transfer effect of learning specific items to passage-level comprehension where those terms were part of the text (A.M. Elleman, personal communication, January 22, 2019). Elleman et al. also found that vocabulary instruction had strong effects on struggling readers ($d = 1.23$) and modest effects on non-struggling readers ($d = 0.39$), suggesting different relationships between vocabulary and reading comprehension based on level of cognitive literacy development.

The general results of Elleman et al.'s (2009) study are in harmony with an earlier meta-analysis conducted by Stahl and Fairbanks (1986), who surveyed 85 studies dating from the 1930s to 1980s that included subjects from second grade through college. Stahl and Fairbanks found average effect sizes of vocabulary instruction as .97 for comprehension on passages where the target terms were included and .30 for reading comprehension in general (effect size calculation formulas resembled Glass's Δ and Cohen's d). As Elleman et al. (2009) pointed out, however, there were several limitations in the meta-analysis conducted by Stahl and Fairbanks, making it possible that there are alternate explanations for their findings.

Wright and Cervetti (2016) conducted a systematic review of prekindergarten through twelfth grade vocabulary interventions (though no prekindergarten studies met the criteria) wherein 36 studies were considered. The researchers used coding methods instead of quantitative analyses and considered, among other factors, types of instruction and assessment that were used in each study. Of the studies that examined direct instruction, they found only two supporting general reading comprehension growth (as measured by standardized reading tests) and 21 that showed significant gains on researcher-designed comprehension measures that included the targeted words. Similar to the findings of Elleman et al. (2009), this research seems to suggest that vocabulary instruction is likely to affect reading comprehension in an immediate sense (on texts that contain instructional items), but may not effectively improve general reading comprehension.

A more recent study by McKeown, Crosson, Moore, and Beck (2018) supports the possibility of students making general comprehension gains over time as a result of vocabulary instruction. This research linked one and two-year quasi-experimental studies in which a robust multi-faceted vocabulary program was used with middle school students. McKeown et al. found significant effects of instruction during the first year on word knowledge, reaction times for target words, and a comprehension dimension of morphology. During this period, group differences were not found for general comprehension. In the second year, however, students who had been part of the treatment group both years were compared with a control group. The differences for the comprehension measure favoring the group that received vocabulary instruction approached significance. As discussed in greater depth in the section of the present

chapter related to incidental vocabulary acquisition, students regularly encounter an immense number of items in texts (Willingham & Price, 2009). The number of words encountered versus the number of words that can be selected for instruction gives good reason to expect that the transfer of vocabulary instruction to general reading comprehension will be slow and difficult to directly detect.

Approaches to Teaching Vocabulary: Direct and Indirect Vocabulary Instruction

In addition to contributing to the discussion on the expected effects of vocabulary instruction on reading comprehension, Wright and Cervetti's (2016) review delineated studies based on the type of instruction given, pointing to the relative effectiveness of different approaches. In their review, 25 studies examined direct vocabulary instruction (wherein specific targeted items were presented by teachers) and seven considered vocabulary strategy instruction (indirect instruction where students were taught techniques for self-guided learning). Among the studies focused on indirect instruction, only two showed significant gains in general reading comprehension—both involved robust methods of working with words as opposed to focusing on one or two strategies. In contrast, 19 of 23 studies involving direct instructional methods yielded positive significant results. Interestingly, as Wright and Cervetti report, four of these studies examined instructional methods involving only brief pre-reading item instruction, all of which had positive effects. This suggests that brevity can be a characteristic of effective direct instruction. There are additional bodies of literature focused on each approach (direct and indirect instruction), and, as I explain in the sections that follow, both approaches are supported by valid arguments.

Incidental vocabulary acquisition. I have generally used the term *indirect instruction* in comparison with *direct instruction* in continuity with what has been thus-far established related to the effectiveness of vocabulary teaching. However, instruction may or may not be needed for what has been termed *incidental vocabulary acquisition* (IVA; Cooper, 2016; Nagy, Herman, and Anderson 1985). To effectively provide opportunity for students to have an adequate number of word exposures to build vocabulary, researchers have recommended wide reading for kindergarten through twelfth-grade (Stahl & Nagy, 2006) and college students (Ari, 2013; Stanovich & Cunningham, 1992).

A primary justification for promoting methods of acquisition other than direct instruction is the apparent futility of teaching individual lexical items, considering the large volume of words that students will encounter (Willingham & Price, 2009). Nagy and Anderson (1984) estimated that school-aged students would be exposed to approximately 88,500 words. Brysbaert, Stevens, Mander, and Keuleers (2016) estimated that, on average, a 20 year old speaker of American English knows 42,000 lemmas (individual dictionary entries), and learns an average of two words per day over the course of the next 40 years. Other estimates suggest that high school graduates are familiar with 32,000-50,000 words (Laufer, 2003; Nation, 1990). Discrepancies aside, any of these figures can serve to illustrate the problem of numbers posed for the educator focusing on explicit instruction of individual items.

Incidental acquisition without instruction. Krashen (1989), a leading voice in the movement against direct vocabulary instruction, espoused what he termed the *Input*

Hypothesis (IH) which holds that language acquisition happens through the input of meaningful messages in the context of reading. From Krashen's perspective, taught inference strategies are unnecessary for vocabulary gains, and the principle of acquisition through wide reading is effective for children, advanced learners, and non-native language learners. Krashen's theory is supported in part by research demonstrating that significant acquisition actually does take place during reading. Nagy et al. (1985) conducted studies with eight graders and, based on their data, projected that a child at a middle-grade level who encounters a new word has at least a five percent chance of acquiring the unknown item into the mental lexicon at the productive level and at least a ten percent chance of acquisition at the receptive level. Using their research data in conjunction with other research available at the time, Nagy et al. estimated that through reading, middle-grade learners acquire between 750 and 5,500 words annually that they can use productively and 1,500 to 8,250 that they could identify correctly on a multiple choice test.

Incidental acquisition with instruction. Often, researchers committed to incidental vocabulary acquisition as the critical means of vocabulary development recommend teaching methods that involve cultivating a consciousness of words and training students in strategies for making meaning of unfamiliar words that they encounter (Nagy et al., 1985; Stahl & Nagy, 2006). There is evidence that teaching students strategies for acquisition is effective. Cubukcu (2008) conducted a study with students in a university English department in Turkey in which a treatment group received five weeks of metacognitive reading instruction that included strategies for inferring meanings of unknown words. The treatment group had significantly stronger

growth than the control group in vocabulary knowledge and reading comprehension. The study conducted by Cubukcu, however, had confounding factors: group selection was voluntary rather than random and the contribution of vocabulary strategies (in comparison with other taught strategies) was not determined. In another strategy training study, Mizumoto and Takeuchi (2009) looked for effects of teaching techniques on student learning of vocabulary through incidental encounters during a ten-week course. In this quasi-experimental study involving non-native speakers of English, Mizumoto and Takeuchi found that the group receiving strategy training made significantly higher test gains than the control.

Differences in incidental acquisition by population. It is possible that wide reading and strategy instruction are not as effective for struggling readers as they are for typical readers. Cooper (2016) found that the number of exposures as well as other factors including reading comprehension level, morphological awareness, and overall vocabulary knowledge affected vocabulary acquisition, with a significant interaction between individual reading comprehension abilities and the number of exposures. Cooper's study would suggest that students with less-developed literacy skills and less motivation to read are less likely to acquire vocabulary incidentally. In a landmark work, Stanovich (1986) discussed a repeating cycle of growth or lack thereof by students based on their previous advancement in literacy development—essentially, Stanovich postulated, the rich get richer while the poor (struggling readers) fall further behind. Perfetti (2007) had parallel findings in event-related potential (ERP) brain imaging studies where good comprehenders demonstrated stronger behavioral and cognitive abilities than poor comprehenders to learn new words. It would seem, therefore, that

students who are less likely to acquire new vocabulary through reading are more in need of direct instruction than other students.

Laufer (2003) challenged several assumptions related to non-native English speakers acquiring vocabulary through incidental encounters (the same challenges might be made regarding struggling readers as well). Laufer questioned whether a reader will independently notice unfamiliar words, make correct guesses about word meanings, and retain word meanings that they have inferred. Laufer's own experimental research indicated that incidental encounters were not superior means of acquisition. Considerations as to how readers choose to apply or not to apply strategies for determining word meanings raises another important challenge to indirect instruction. Researchers have indicated that word saliency—noticeability—is an important aspect of acquisition through incidental encounter (Freebody & Anderson, 1983; Willingham & Price, 2009). It is possible that students will fail to notice words that might be important for future reading. Leaving the process of vocabulary selection (choosing focus items) to subjective student judgement may be problematic, and it would seem that this would be of particular concern for readers who already struggle with text comprehension.

Direct instruction. According to Willingham and Price (2009), direct instruction is typically “teacher led, student practiced, and tied to a specific objective” (p. 98). Baumann (1988) pointed out that there are discrepancies between different understandings of what comprises direct instruction. In Baumann's view, the teacher, and not material provided, is the most critical factor in actual direct instruction. While in accordance with this perspective, instructional faculty will be crucial to the proposed

model in this dissertation, I allow a broader definition of direct instruction for the purpose of reviewing the relevant literature. Vocabulary instruction may be considered direct when lexical items are intentionally selected for students to learn and information about these items is presented directly to students. This could be provided by a teacher, a computer-based application, or through printed material.

Among the researchers who have conducted studies on the use of direct vocabulary instruction at the university level, Craig, Ehri, and Hart (2017) conducted a study in which post-secondary students were randomly assigned to one of three treatment groups for vocabulary instruction or to a control group. One treatment group learned strategies for using contextual, morphological, and syntactical clues for gaining meanings for unknown terms. A second group was provided definitions, and a third group was given strategy instruction and definitions. All treatment groups outperformed the control group in answering comprehension questions, spelling, definition recall, and completing a cloze reading task where students filled target words into blanks. Cohen's effect sizes for the treatment groups ranged from $d = .56$ to $d = 2.0$, with the strategies plus definitions group having the greatest number of significant results. Craig et al. reported that the treatment groups did not outperform the control group, however, on a transfer passage containing the targeted items.

In a study with similar results, Sonbul and Schmitt (2010) divided students from English for specific purpose (ESP) courses at a Saudi Arabian university into a reading-only and a reading-plus-direct instruction group. The effect of direct instruction on word meaning recall was moderately strong ($r \geq .5$) and modest effects were found for word

recall and recognition ($.3 < r < .5$). Sonbul and Schmitt's instructional methods included providing definitions. Further demonstrating the importance of definitional instruction, Nist and Olejnik (1995) conducted a study with university students that examined the factors of context and definition for vocabulary acquisition and found that the provided definition quality was the most significant factor in vocabulary acquisition.

Incorporating direct and indirect instruction. It is important to note that choosing instructional methods for the purpose of vocabulary acquisition is not relegated to an either-or proposition. There are recognized benefits of teaching strategies to aid students with acquisition through incidental encounters which are in no way negated by the need for direct item instruction. The question is not whether strategies for incidental acquisition should be taught, but rather if this should be the only kind of vocabulary instruction that is systematically provided.

The use of both direct and indirect instructional models reflects the recommendations of the National Reading Panel (2000). The more compelling arguments against direct instructional models (related to the volume of items to learn) are informative in thinking about what to avoid—namely spending too much time teaching any specific term. This concern also helps to emphasize the importance of careful selection of terms to teach (Stahl & Nagy, 2006). This issue is addressed robustly in the third chapter and is a highlighted concern that gives rise to the need of the kind of model that is presented in this dissertation. As will also be addressed, it is possible that meaning inference strategies can be practiced through direct item instruction.

Lexical Quality and Vocabulary Depth Considerations in Instructional Methods

Vocabulary comprehension is not only a matter of whether words in a text are known, but how well they are known (Nagy, 1988; Swart et al., 2017). Researchers have studied receptive vocabulary from the earliest years of life (for example, Mayor & Plunkett, 2014; Suttora et al., 2017) and have analyzed the vocabulary of authors of literary works of genius (for example, Kolentzis, 2014; Rowse, 1994). A plethora of questions about the causes, processes, and varying degrees of outcomes related to mental representation of words lies between these poles. Creating a pedagogically sound model of vocabulary instruction requires a working knowledge of how the most relevant of these questions have been addressed in contemporary research.

Lexical quality. The Lexical Quality Hypothesis (LQH) postulates that the stability of representation of words underlies text comprehension (Perfetti, 2007; Perfetti & Hart, 2002). According to this hypothesis, the quality of word representation in a person's mental lexicon depends on the bonding of orthographic, phonological, and semantic information, which encompasses meaning and grammatical knowledge (Perfetti & Hart; Richter, Isberner, Naumann, & Neeb, 2013). This hypothesis suggests that determining lexical knowledge for any item is more than a binary question of familiarity versus non-familiarity, but rather is best evaluated a continuum based on interwoven layers of knowledge.

Lexical quality and instruction. The possibility of specific types of training affecting lexical strength of representation was addressed by Frishkoff, Perfetti, and Collins-Thompson (2010). These researchers presented subjects with rare novel words in

relatively constrained and unconstrained sentences—the context of the constrained sentences limited the possible meanings of the targeted words, making accurate inference likely. To compare the effects of training, Frishkoff et al. looked for behavioral performance differences as well as differences in neuro-responses (using an N400 paradigm common electroencephalogram [EEG] studies; Kutas & Federmeier, 2000). Frishkoff et al. found that words trained in high-constraint contexts, like known words, elicited strong expected neurological responses whereas words trained in low-constraint contexts elicited weaker responses. Additionally, they found that subjects performed significantly better on high-constraint than low-constraint trained words on a posttest.

Frishkoff et al.'s (2010) experiment addressed two topics that are relevant to the current study. The low-constraint presentations are representative of one possible type of incidental vocabulary encounter that a student may have while reading. The study raises concerns about the strength of representation and usable word knowledge acquired in such an encounter. Another implication is that more effective word training can potentially produce stronger mental representations.

Vocabulary depth. Vocabulary depth is a paradigm that has similarities to the Lexical Quality Hypothesis (LHQ; Perfetti, 2007), though the two constructs are not consistently linked in the literature. Whereas lexical quality relates to mental representation (Perfetti), vocabulary depth can refer to the level of understanding of the way that a word associates with other words, including collocation, and of word characteristics, such as morphology (Milton, 2009). Hence, vocabulary depth is easier than lexical quality to measure using behavioral assessments. Concepts of vocabulary

depth stem from the works of Richards (1976) and Nation (1990)—whose landmark work, *Teaching and Learning Vocabulary*, has reshaped the scholarly discourse related to the components of word knowledge (see Read, 2000).

Receptive and productive word knowledge. Differentiation of vocabulary depth is exemplified in differences in abilities to recognize items and use them in speech or writing. The categories of receptive and productive vocabulary have transparent labels: *receptive* refers to passive recognition whereas *productive* refers to active use (Lee & Muncie, 2006). Nation (1990) distinguished the specific kinds of word knowledge needed for each category in the following way: receptive knowledge involves an understanding of what a concept encompasses whereas in order to have productive knowledge, one needs to use the concept to make references (p. 27; see also Schmitt & Meara, 1997). As an illustration, receptive knowledge of the lexical item *communication* would include an understanding that the term encompasses verbal and written messages whereas the more advanced productive knowledge of the term might allow one to use it to refer to an email that was sent from a professor to a class.

Willingham and Price (2009) stated that college vocabulary development has typically focused on productive rather than receptive vocabulary knowledge. However, these categories represent levels on a continuum of mastery instead of a binary model (Henriksen, 1999). In the context of university reading support classes, the distinction between receptive and productive vocabulary is helpful for assessment, but not a fundamental concern for instruction. If depth is considered as a goal of instructional methods, it is logical to assume student ability to produce items will be increased.

Vocabulary depth and instruction. Researchers have called for the inclusion of instructional methods that promote vocabulary depth for some time (Nagy, 1988; Nation 1990). For example, Beheydt (1987) highlighted the need of understanding words in terms of morphology, syntax, collocation, and meaning as crucial aspects of what he called *semantization*—a term that describes the process of learning vocabulary with an emphasis on flexibility of representation giving access to item meanings in a variety of contexts (see also, Henriksen, 1999). More recent studies have incorporated important components of vocabulary depth into comprehensive models of reading instruction with significant results in several areas, including reading comprehension (Lesaux, Kieffer, Kelley, & Harris, 2014; Lubliner & Smetana, 2005). While these studies speak positively for emphasizing depth in vocabulary instruction, their multifaceted nature makes it difficult to determine the degree to which the vocabulary instruction contributed to reading comprehension.

McKeown, Beck, Omanson, and Perfetti (1983) found significant differences between treatment and control group reading comprehension scores after a five-month vocabulary study wherein the treatment group received vocabulary instruction with attention to depth. However, the reading comprehension test was a posttest only, leaving open the possibility that scores were influenced by prior skills and knowledge. In summary, there are indications that teaching practices affect vocabulary depth, but there is a need for further research in this area.

Another way the concept that teaching with vocabulary depth as a goal can be supported is to link the broader literature discussed in this chapter supporting the

relationship between vocabulary depth and comprehension (for example, Swart et al., 2017) and the effects of vocabulary instruction (for example, Elleman et al. 2009) with studies indicating that depth of vocabulary instruction has effects on vocabulary acquisition and retention. Zimmerman (1997), for example, found that significant vocabulary growth occurred as a result of in-depth instruction. Zhang and Lu (2015), using structural equation modeling in a study involving 150 young adult English language learners, found that areas of instruction that connected with depth such as naming synonyms and antonyms, morphology, and word associations, positively correlated with tested vocabulary depth ($r = .52$) and with word meaning recognition ($r = .44$). An additional benefit of focusing on vocabulary depth in direct instruction is that exploring word structures and contextual relationships equips students with skills for inferring word meanings in incidental encounters (Stahl & Nagy, 2006).

The depth at which an item is understood is not simply dependent on what is known about the word itself, but also how it functions in context. For this reason, I turn to a discussion of the use of academic vocabulary in academic texts.

CHAPTER THREE: LITERATURE REVIEW: ACADEMIC VOCABULARY, ACADEMIC LANGUAGE, AND CORPORA

Academic vocabulary functions as part of an academic register of English that has characteristics that are different from other registers (Nagy & Townsend, 2012). In the context of university-level disciplinary reading, navigating academic language and acquiring necessary vocabulary are among the more daunting challenges that students face. Some researchers have approached this challenge by identifying specific high-frequency items to be taught (for example, Coxhead, 2000). In this chapter, I give consideration to what academic vocabulary is and explore its function as part of academic language. I explain some of the historical background of the development of corpus linguistics and discuss the notable benefits of using corpora to identify, understand, and offer instruction in academic vocabulary. Significant challenges to this approach presented by Hyland and Tse (2007) are very informative in consideration of the question of the validity of teaching high-frequency academic vocabulary. I address these challenges and include insights from them as they relate to building a sound model of item selection.

Definition and Categories of Academic Vocabulary

Academic vocabulary refers to the words that are specific to academic discourse (Nushi & Jenabzadeh, 2016). Baumann and Graves (2010) reviewed related literature and concluded that academic vocabulary falls into five categories: domain-specific, general academic vocabulary, literary vocabulary, metalanguage terms (used to explain language), and symbols. There are two commonly distinguished types of academic

vocabulary: discipline-specific and general. Discipline-specific, or technical, vocabulary refers to items that are specific to particular academic domains (Harmon & Wood, 2018). General academic words occur across disciplinary texts and are found more commonly in academic language than in other forms of communication (Nagy & Townsend, 2012). While discipline-specific academic vocabulary plays an important role in text comprehension (Hooper & Wells, 1981; Nagy & Townsend), my aim in this study is to construct a model of vocabulary instruction that aligns with the goal of reading support classes to teach literacies that will transfer to different academic settings.

Academic vocabulary has been of particular interest to researchers and educators considering instructional practices for populations of American students in middle grades and beyond (Bintz, 2011) and for non-native speakers of English in English for Academic Purpose (EAP) courses at non-American universities (Szudarski, 2018). Because of a dearth in literature relating to academic vocabulary and struggling college readers, knowledge gained in relation to these other populations must be appropriated for the present study.

Academic Vocabulary as a Part of Academic Language

According to Nagy and Townsend (2012), academic vocabulary must be understood in the context of academic language—the register of academic settings. Nagy and Townsend pointed out that while thinking about individual words serves as an entry point for educators who do not have backgrounds in linguistics, it is nonetheless important for instructors to address the particular functions of academic terms within their contexts. In the university reading support class setting, the purpose of teaching

academic vocabulary is to increase student comprehension of academic texts—a goal that will be advanced by students gaining a stronger sense of the nature of academic language.

Access to academic language. Personal access to academic language is shaped by many variables including language background and socio-cultural factors (Cumming, 2013). Students may be advantaged or disadvantaged by the registers and modes of communication in which they have been enculturated (Uccelli, Galloway, Barr, Meneses, & Dobbs, 2015). It can be generally argued that academic language is a register of the white elite (Russell, 2018). This coincides with Nagy and Townsend's (2012) point that academic language stems from class stratification in medieval Europe. This divide is evident in current demographics: Uccelli et al. found inequalities in access in a study with upper elementary students in urban school districts in the United States. In this study, performance using academic language skills differed, as might be expected, by proficiency with the English language, and (perhaps surprisingly) to a greater degree by socio-economic status (SES).

For the purposes of the present study, it is important to simply acknowledge that many students have not had adequate access to academic curriculum because of barriers related to academic language—a seeming likelihood in university prescribed reading support classes. In order for reading support courses to help level the proverbial playing field, instructional planning must pay attention to this gap so that it can be addressed in ways that are pedagogically appropriate. As a beginning point, faculty can heighten student awareness that academic language is a potentially new register (to students) that needs to be learned and progressively mastered.

Researchers and practitioners have created multiple instructional activities to help students acquire skills for navigating particular aspects of academic language (Neal, 2015; Uccelli, 2013). These approaches are appropriate in the larger context of reading support classes, but are beyond the scope of the present study. Because, however, authentic student texts are the primary materials used for developing literacies in university reading support classes, individual terms encountered and their functions within these texts can serve as catalysts to discuss features of academic language.

Characteristics of academic language. Nagy and Townsend (2012) identified the following common characteristics of academic language: (a) Greco-Latin roots, (b) morphological complexity, (c) greater density of nouns, adjectives, and prepositions, (d) nominalization, (e) condensed information, and (f) expression of abstract concepts (p. 93). These descriptors are helpful because university reading support faculty can identify general categories to aid student understanding of the functions of particular words in the larger context of academic discourse. Nagy and Townsend pointed out that these characteristics are interconnected. For this reason, the discussion that follows holds characteristics together in ways that might be used to organize class discussions about academic language when analyzing academic texts.

Greco-Latin basis for academic words. Many words from Greco-Latin origins are used in particular disciplinary contexts (Corson, 1997), and are not frequent across disciplines (for example, *anthropology*, *axisymmetric*, and *phalanges*). However, Corson pointed out that the top 150 words on the University Word List (designed for English language learners; Xue & Nation, 1984) are almost all terms with Greco-Latin origin

(96%, to be exact). Corson further stated that Greco-Latin words are typically first encountered in textbooks, serve particular academic functions, and represent a cultural literacy of educated citizens. Latin and Greek morphemes help to create morphologically complex items—a body of words that Nippold (2018) called the “literate lexicon” (p. 211). Based on one of Nippold’s previous studies, derived nominals and adjectives (nouns and adjectives derived from verbs by attaching affixes) made up 4.7% of a corpus of science texts ($N = 5,433$) and 5.7% of a corpus of mathematics texts ($N = 2,733$; Nipold, 2017, as cited in Nipold, 2018). Morphologically complex items can represent abstract ideas and contribute to the density of academic text.

Density, abstractness, and nominalization. As Schleppegrell, (2001) stated, lexically dense writing is useful in academic texts because it allows authors to be economical with words while communicating a high volume of information. The phenomenon of density is illustrated in the following noun phrase: “the maturation of the larvae.” *Maturation*, as represented in the phrase, is created by nominalization—wherein one part of speech (an adjective, in the example) is used in an uncharacteristic fashion while preserving the term’s original meaning (Nagy & Townsend, 2012). Creating a noun phrase that express a preposition allows an author to condense an elaborate abstract idea into a few words. If the noun phrase is used as the subject of a sentence, more information can be succinctly expressed about it (Nagy & Townsend).

Corpora and Academic Vocabulary

A corpus is a body of text of written or spoken language that is electronically searchable. The approach of corpus linguistics plays a fundamental role in contemporary

practices of identifying academic vocabulary (Szudarski, 2018) and also informs both sides of a debate as to whether a general academic vocabulary and, by extension, a general academic register (as opposed to disciplinary vocabularies and registers), are helpful constructs. A corpus-based approach is essential to a contemporary viable model of selection and instruction of academic vocabulary, and additionally gives the practitioner tools for understanding how particular lexical items function as units of academic language across disciplines. In order to explain the current capabilities of instructors that are enabled by corpora, it will be helpful to discuss briefly the historical development of corpora in relationship to vocabulary instruction.

Historical background of corpus linguistics and word lists. Since the 1920s, there have been attempts to create lists of words that were deemed essential for learning (Szudarski, 2018). A problem with such lists, as Szudarski stated, is that decisions for inclusion were made subjectively. This, for example, was the case with the well-known General Service List of English Words (GSL), developed for general language instruction of non-native speakers of English (West, 1953). The use of corpora for quantitative studies in language began with the work of Biber and colleagues at Northern Arizona University in the late 1980s (Charles, Pecorari, & Hunston, 2009; Cortes & Csomay, 2015). The available technology, as Szudarski pointed out, has facilitated the creation of word lists based on lexical frequency. While these lists have been particularly designed for instruction with non-native speakers of English, some researchers have recognized the potential value of bridging the gap between vocabulary instruction for non-native and native English speakers, noting that instructional needs are similar (Carlo et al., 2004; Hiebert & Lubliner, 2008; Graves, 2006).

Some word lists are particularly prevalent in the literature related to vocabulary instruction. The Academic Word List (AWL; Coxhead, 1998) is a notable corpus-based list of academic English words organized by word family. The AWL covers about 10% of the corpus from which it was derived. The AWL developed from the earlier University Word List (UWL; Xue & Nation, 1984), though more advanced methods of corpus linguistics were applied when building the AWL (Coxhead, 2016). The Corpus of American English (COCA) is perhaps the most frequently used English corpus (Davies, 2008-; Gardner & Davies, 2014). The COCA contains over 560 million words and has a large academic subsection that is the basis for the Academic Vocabulary List (AVL; Gardner & Davies)—words from the list cover approximately 14% of the academic texts. The COCA and its academic subsection can be searched independently with a Web-linked Word and Phrase Tool (Davies, 2013), discussed in-depth in the fourth chapter.

Formulaic language and collocation in corpus linguistics. In addition to information about frequency, research in corpus linguistics is valuable to vocabulary instruction because of what can be known about co-occurrence of words, or what is termed formulaic language (Schmitt, 2010; Szudarski, 2018). There are two ways to view formulaic sequencing: One can assume a psycholinguistic perspective with a focus on how words are mentally stored (Wray, 2002) or take an approach based on data from corpora. Formulaic language is a very complex area of study, and there is wide divergence in perspective and terminology related to the topic (Schmitt). While commonly discussed types of co-occurrence include lexical items (words that together compose one unit of meaning; Sinclair & Carter, 2004) and idioms (Syunina, Yarmakeev,

Pimenova, & Abdrafikova, 2018), collocations are of particular interest in the present study.

Collocations are combinations of two-to-three lexical items that frequently occur together and are transparent in meaning (Henriksen, 2013; Laufer, 2011). Significant collocation happens when items occur together at a much greater frequency than would be predicted to occur by chance (Sinclair, Krishnamurthy, Daley, & Jones, 2004). These frequencies can be determined using corpora-based tools (Szudarski, 2018). Chapter Five includes a discussion about how knowledge of collocation can aid instruction in academic vocabulary. At this point, however, a basic understanding of collocation is necessary for a discussion informed by corpus linguistics regarding the legitimacy of vocabulary selection and instruction that is designed to transcend academic discipline.

Can Academic Vocabulary be Taught?

Conducting a corpus-based study, Hyland and Tse (2007) examined the usefulness of the concept of a general academic vocabulary through an analysis of the word families found in Coxhead's (1998) Academic Word List (AWL). Hyland and Tse argued that only a small number of word families from the AWL (35, specifically) that should be considered high-frequency are also evenly distributed across disciplines. They found that particular word meanings varied greatly between disciplines. For example, *volume* was much more likely to mean "quantity" than "book" in science and engineering, but was equally likely to mean either in history (Hyland and Tse).

Because academic texts frequently communicate very technical types of information, collocations can be particular to specific disciplines. For example, Hyland

and Tse found that *convert* was used in the collocation “convertible security” in 41% of occurrences in business texts—an obviously unique collocation that communicates a concept specific to one discipline (note the derivational difference of *convertible*). In line with this, Hyland and Tse demonstrated that high-frequency terms tended to collocate with different items in different disciplines. For example, they presented an analysis of the term *strategy*, which collocated with *marketing* in 11% of occurrences found in business texts, with *learning* in 9% of occurrences in applied linguistics texts, and with *coping* in 31% of occurrences in sociology texts. Based on the differences among disciplines, Hyland and Tse believe that reading in each discipline should, in a sense, be treated as a separate literacy.

Arguments in favor of an academic vocabulary construct. A challenge to Hyland and Tse’s (2007) logic can be made using one of the authors’ examples. Hyland and Tse pointed out that the term *process* was more apt to be used as a noun in the sciences than in the social sciences (it may also be used as a verb). They discussed the transformation of *process* through nominalization (discussed in the section of this chapter related to academic language). These two meanings of *process* demonstrate an example of polysemy—where there are two or more related senses of one word. Polysemy happens as a result of nominalization, in this case, because no morphemes are added to create a distinction between the noun and the verb (as is the case with *hibernate* and *hibernation*).

Countering Hyland and Tse’s argument, the fact that the two meanings of the word *process* are connected makes it possible that learning the word in one context would

yield a degree of transfer to another context, especially if polysemy were to be considered in the methods of instruction. It is possible that a pedagogical framework for teaching interdisciplinary vocabulary could approach polysemy in a way that is mindful of contextual differences of various disciplines and facilitates instruction aimed to produce the desired flexibility of representation.

It is important that Hyland and Tse (2007) do not, in fact, discourage the use of a word list model; they simply provide caution as to how it is used. A worthy goal of academic instruction is to represent the reality of any situation as clearly as possible. It is accurate to say that there are recognizable characteristics of academic language across disciplines and that there are also specific literacies needed for each discipline. Corpora provide a key to navigating both realities—examples of the usage of individual terms in representative texts from different disciplines allow educators and students to explore the extent to which any given lexical item can be considered to be a high-frequency interdisciplinary term. Further, examples from corpora can demonstrate similarities and differences in usage of particular items among different disciplines.

CHAPTER FOUR: BUILDING A CORPUS-BASED INSTRUCTIONAL MODEL FOR INTERDISCIPLINARY ACADEMIC VOCABULARY: ITEM SELECTION AND CORPUS METHODOLOGY

In this chapter, I briefly explore different past approaches that have been used for selecting high-frequency academic vocabulary and the weaknesses for use of these approaches in the context of university reading support classes. I then describe the applications of the Word and Phrase Tool (Davies, 2013), a Web-based interface that gives the user quick and navigable corpus data based on text that is scanned and entered, and I explain reasons that I believe this interface offers instructors a superior method of vocabulary selection. Though this instrument provides the basis for empirical means of item selection (Townsend and Kiernan, 2015), the selection process still involves instructor decision-making. I present several considerations and methods for making item selections, offering authentic examples of terms identified using these methods. To give a sense of how the outcomes of the process tie into the larger discussions of interdisciplinary academic language and vocabulary, I provide analyses of selected exemplars that demonstrate the legitimacy of the model as well and give consideration to its inherent challenges.

Approaches for Selecting High-Frequency Terms

As discussed in the introduction, reading support courses that are paired with disciplinary content courses primarily use assigned readings as the context for literacy instruction. In the preliminary small-scale study presented in the fifth chapter, reading courses were paired with United States History courses. In this context, there are several

reasons why it is essential to use authentic texts. Literacy instruction that supports comprehension of assigned texts gives students a practical purpose for embracing and using this instruction. As discussed in the second chapter, there is evidence that teaching specific terms from given texts supports comprehension (Wright and Cervetti, 2016). One intent of vocabulary instruction is that it will yield immediate benefits in student understanding of the texts that they are studying. Based on a comprehensive understanding of how words function as connected smaller units of language, as discussed in the third chapter, contextual instruction is the only sound model for vocabulary acquisition (Nagy & Townsend, 2012).

Given the fact that reading support faculty members are responsible for a wide array of literacy instruction, an economical model with limited demands for preparation time is valuable. Yet, in order to avoid the pitfalls of subjective judgement, an empirical model is also desirable. Until recently, a comprehensive selection method that met both criteria was not possible.

Instructor-driven selection. Recognizing the need to select terms from authentic texts that would be useful to students, Beck, McKeown, and Kucan (2002) suggested that instructors select what the researchers called Tier Two terms. Tier One terms, in their approach, are the highest frequency words—terms that students would likely already be familiar with. Tier Three words are lower frequency items, many of which are discipline-specific. While some of these terms may need to be taught in context within a specific discipline, there would not be adequate justification for including them in general academic vocabulary instruction (Kamil, 2004). Tier Two comes the closest to the idea

of interdisciplinary vocabulary—mid-frequency terms that are likely to appear in different types of text (Beck et al.). Building on the model proposed by Beck et al., Graves et al. (2013) developed criteria for item selection in what they termed the Selecting Words for Instruction from Texts (SWIT) approach. The SWIT method involves locating four different types of words: essential, valuable, accessible, and imported (terms that enhance understanding of an instructional text but are not found within that text). These approaches gave educators logical steps for approaching context-based instruction of interdisciplinary academic vocabulary.

While there are benefits to the approaches suggested above, without the benefit of corpora, there is no way to be certain that the terms a teacher selects are, in reality, more beneficial to students than other items that might be overlooked. Empirical means of making decisions are known to be more accurate than intuition (Stanovich, 2013). This simply suggests that approaches used prior to the availability of current technologies are now outdated.

Corpus-based, data-driven selection. Academic vocabulary can be searched in specialized corpora composed of texts deemed to be academic in nature (for example, textbooks and academic journals; Szudarski, 2018) or by using word lists, such as those discussed in the second chapter of the present study. One approach for a corpora-based method of word selection would be to identify potential terms to target from student texts and then look for them on an available word list. The Academic Word List (AWL; Coxhead, 1998), for example, is available online in different formats including organization by alphabetical lists of headwords and by sublists of families. There are

drawbacks to exclusively using this method for selection. First, the responsibility of initial selection falls on the instructor, as was the case with purely instructor-driven selection. Additionally, the typical word list format does not provide information such as overall frequency, frequency by discipline, or examples of usage (see, for example, Coxhead; Xue & Nation, 1984), still creating a non-transparent selection process.

There are direct corpus-based operations that might help resolve the concerns related to a word-list-only approach. Online corpus tools are available for performing searches within specific corpora to identify collocates, find item frequency, and view corpus examples. For instance, the Sketch Engine (Kilgarriff et al., 2014; Lexical Computing, 2015) and the Compleat Lexical Tutor (Cobb, n.d.) both possess these capabilities, though their complexities would make them difficult to navigate for instructional preparation. It is also possible to monitor item frequencies in course texts by using instructor-created corpora with the help of a computer-based concordancer, as suggested by Donley and Reppen (2011; incidentally, this feature is available on the Sketch Engine website, Lexical Computing).

While an empirical method for word selection is now possible using corpus-based technologies, the time that it would take an educator to conduct the procedures needed using almost any of the available tools makes this approach impractical. As is the case with most academic settings, vocabulary instruction in university reading support classes is just one of many instructional components. For an item identification method to be sustainable, it would need to be based on simple, user-friendly processes.

Using a Web-Based Interface that Meets Instructional Needs

Townsend and Kiernan (2015) described how the Word and Phrase Tool (Davies, 2013) fulfills several needs for effective instruction, including providing a simple way to identify high-frequency academic vocabulary within selected texts. The tool is Internet-based and can be set to scan the entire Corpus of Contemporary Academic English (COCA) or texts from its academic subsection (Davies, 2008-). A text can be scanned into a computer or selected from an electronic text and can be copied into the interface. The program yields color-coded feedback identifying high-frequency vocabulary of different classifications, as exemplified in Figure 1. Items coded in red are identified as having high frequency in specific disciplines. Items that are yellow make up the most frequently occurring 500 terms in the Academic Vocabulary List (AVL) and items that are green are part of the extended AVL, representing the frequencies rankings of 501-3,000 (Davies, 2013; Gardner & Davies, 2014).

Various types of analyses are displayed when a color-coded item from the output section of the interface is selected. As highlighted in Figure 2, a bar graph representing a breakdown of word frequency (per million words) by discipline is displayed for each of the following disciplines: “history, education, social science, law/political science, humanities, philosophy/religion/psychology, science/technology, medicine/health, and business/finance” (Townsend and Kiernan, 2015, p. 116).

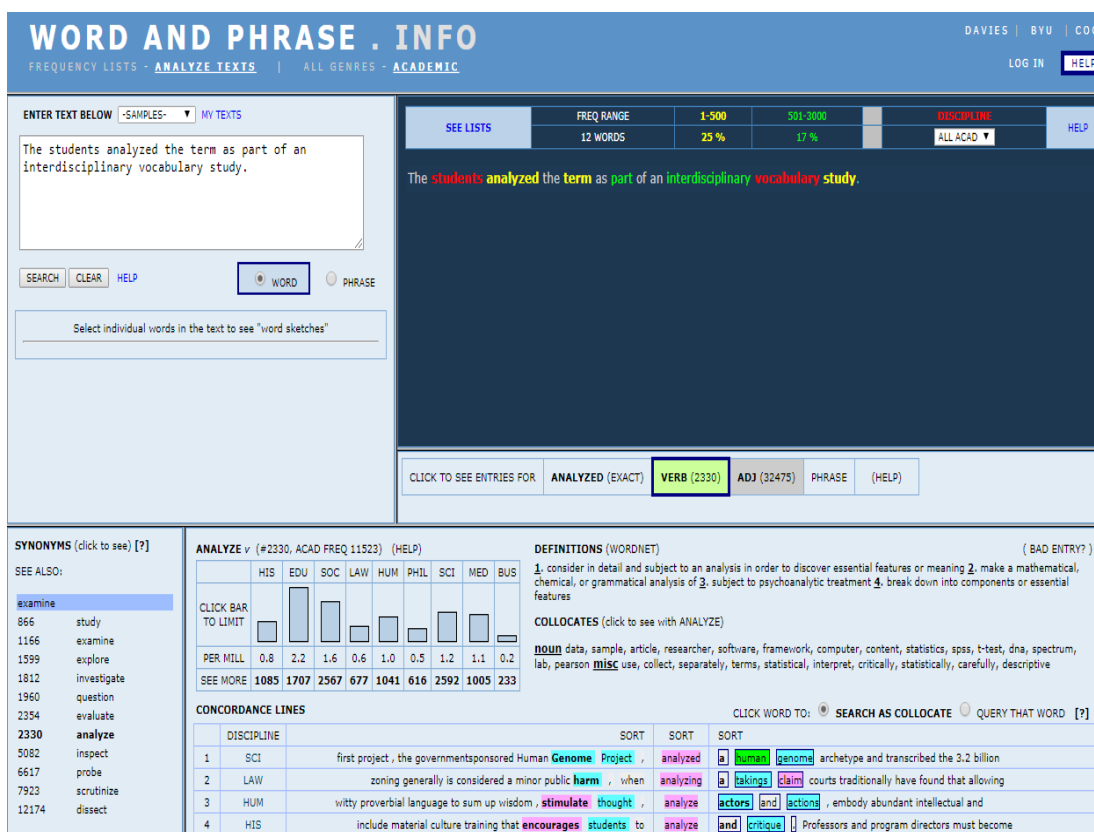


Figure 1. Word and Phrase Tool screenshot. Davies (2013). Retrieved January 8, 2018, from <https://www.wordandphrase.info/academic/analyzeText.asp>. Used with permission (Appendix

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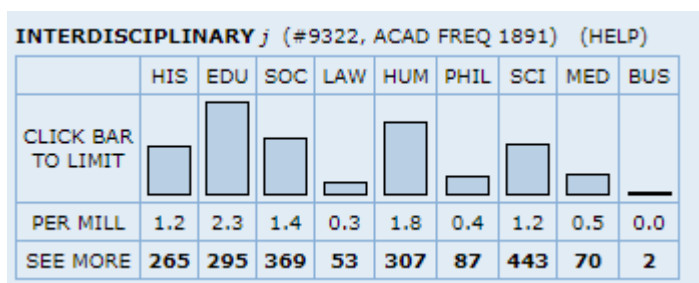


Figure 2. Word and Phrase Tool screenshot of disciplinary frequencies. Davies (2013) retrieved February 18, 2019, from www.wordandphrase.info/academic/analyzeText.asp. Used with permission (Appendix B).

In comparison with Coxhead's (1998; 2000) AWL, that uses word families, Gardner and Davies' (2014) AVL uses lemmas—individual dictionary entries.

Comparatively, Gardner and Davies' approach limits the number of words considered to be high-frequency. The lemma feature is more effective than the word family approach in avoiding the inclusion of items with different meanings and unrelated collocations under the same word heading. This partially addresses one of Hyland and Tse's (2007) concerns related to the frequency paradigm. In Gardner and Davies' model, only inflectional differences are included in connection with any term. In other words, the terms *analyze* and *analyzed* would be included under the same heading because the inflection does not change the meaning. However, *analysis* would be considered as a separate entry.

Gardner and Davies (2014) used four metrics to qualify the lemmas in the Academic Vocabulary List (AVL; which contains 3,014 lemmas, to be exact) as high-frequency interdisciplinary academic vocabulary. Terms were deemed academic because they occurred in academic texts with at least 50% greater frequency than in the larger corpus and interdisciplinary because they occurred at least at a 20% greater-than-expected rate in at least seven of nine identified disciplines. Additionally, the even spread of each item was tested with a qualifying dispersion of at least .80 (1.00 would indicate a completely even dispersion) and a frequency measure was used within each discipline—an included item could not occur in any discipline at more than three times the expected rate. Gardner and Davies acknowledged that these limits were somewhat arbitrary, as there were not existing reference points. They presented examples of how experimentation with various metrics helped them set satisfactory levels. For example, Gardner and Davies shared that a dispersion level of .80 excluded the disciplinary terms *taxonomy* and *microcosm* while maintaining academic terms just above the .80 level such

as *detect* and *coordinate*. The level of care that has been applied to word selection in the AVL can create confidence in using it in an instructional item-selection process. As it is searchable through the easy-to-navigate Word and Phrase Tool (Davies, 2013), the AVL is a core component of the model discussed in the present study.

Finding a frequency range for selecting academic vocabulary. The three levels of frequency identified by the Word and Phrase Tool (Davies, 2013) mirror, to some degree, the tier system proposed by Beck et al. (2002), and discussed in the section of this chapter on instructor-driven word selection. While Beck et al. believed that Tier Two terms were generally the most useful for instruction, the decision should be based contextually on the needs of students. Since academic journals are included in the academic subsection of the Corpus of Contemporary Academic English (COCA; Davies, 2008-), it is possible that the most frequent terms (in the 1-500 range) would be the best starting place if the interface were to be used below the college level. For non-native speakers of English, an instructor would need to use student levels of reading comprehension or generalized vocabulary testing to help determine which range to use. Because it is likely that many of the most frequent terms would be known by university students, the expanded section of the Academic Vocabulary List (AVL; frequency levels between 501-3,000) would seem to be a good fit. This approach is in line with Gardner and Davies' (2014) recommendations and also generally reflects the concept of the Tier Two approach (Beck et al.). It is important to note that no frequency range is particularly designed for any level of student knowledge—instructor-selected thresholds are somewhat arbitrary. Through experience and various forms of student assessment, an

educator can identify the range that tends to be most helpful for student lexical acquisition (where unknown items tend to begin to occur).

The red-coded (discipline-specific) items identified by the Word and Phrase Tool (Davies, 2013) may be as or more important to immediate text comprehension than the terms that make up the Academic Vocabulary List (AVL; Davies & Gardner, 2013). However, it is likely that an educator working within any specific discipline will be aware of the vocabulary that is needed to communicate the technical information that is being taught. While discipline-specific terms do play an important role in vocabulary instruction in university reading support courses, they do not, by definition, fall within the scope of the present study.

It is possible to further narrow the field of instructional word options from the green-coded terms that compose the expanded Academic Vocabulary List (AVL; Davies & Gardner, 2013) by requiring particular levels of frequency within a specific number of disciplines. For example, in the related small-scale study, I opted to only consider words for instruction that were identified by the Word and Phrase Tool (Davies, 2013) as having a minimum of one occurrence per million words across at least three disciplines of the academic subsection of the Corpus of Contemporary Academic English (COCA; Davies, 2008-). I suggest this as a reasonable added criterion.

Imposing additional limitations on items that Gardner and Davies used creating the Academic Vocabulary List (AVL; 2014) has benefits and drawbacks. Students enrolled in university reading support courses who continue in their studies will go on to majors in a variety of disciplines. If an item is particularly frequent across multiple

disciplines, it stands to reason that a number of students will be likely to have subsequent encounters with the term where lexical knowledge would benefit reading comprehension. As an example, the term *prevailing*, when used as an adjective, would meet the stated qualification—it occurred above the minimal frequency in the disciplines of law (1.7 per million), history (1.6 per million), sociology (1.2 per million) and the humanities (1.1 per million), and approached the required frequency in education (0.9 per million). Occurring at a higher frequency in multiple disciplines makes a term like *prevailing* more desirable to select than a term that does not meet the same interdisciplinary standard.

It would be logical to argue, however, that the metrics used in selecting the items in the AVL (Gardner & Davies, 2014) are sufficient for screening and that an item that does not meet the one-occurrence-per-million mark in three disciplines may be more evenly spread among all disciplines than an item that meets the standard. As is the case with other lines of demarcation for inclusion of items, any additionally imposed qualifiers are arbitrary. Taking the approach that Gardner and Davies took when creating the AVL, an instructor can experiment with different rules and note which terms are retained in each instance. Additionally, the number of items yielded by the search process will determine the level of scrutiny that is desirable.

Selection of items based on likelihood of future encounter. After determining the qualifications for frequency, the next step is to identify the terms that will most likely be helpful to the students. Examples of word usage from corpora are displayed in the Word and Phrase Tool (Davies, 2013) when a color-coded word is selected for analysis.

The need for corpus-based instructor decisions can be illustrated by searching the item *advent*, which was located by scanning authentic student text (Davidson, DeLay, Heyrman, Lytle, & Stiff, 2015). The Word and Phrase Tool (Davies, 2013) reported that this term occurred most frequently—an average of 1.8 times per million—in texts categorized under the disciplinary heading of philosophy. As demonstrated in Figure 3, many of these occurrences were in the context of theology-related publications, and refer to a season on the church calendar. Additionally, there are occurrences outside of the philosophy literature that reflect this use of the term (Figure 3 shows an occurrence in law-related text). It is unlikely that most students studying at a state university would encounter the proper noun *Advent* as a part of their educational curricula. An observation of differences in usage would lead to a reevaluation of item inclusion. Because differences of word meaning in the example are not delineated in frequency counts in the Word and Phrase Tool (Davies), further analyses would need to be carried out by looking at provided examples of usage.

	DISCIPLINE		WORD	WORD	WORD
1	PHIL	most sacred time of the Christian year , rivalled only by	Advent	and	Christmas
2	PHIL	he has the most clout , being the premier prophet of	Advent	and	getting plenty
3	HUM	, three conditions-the failures of large bureaucracies , the	advent	and	rapid advance
4	LAW	Shall Be Revealed . " Revelation is an essential ingrethent of	Advent	at	whose heart
5	SCI	to the CD-ROM drive and available external drive bay . The	Advent	AV009	speakers sound
6	SCI	out and a bit fuzzy at the edges . The bundle	Advent	AV390	PL speakers
7	PHIL	a profound spiritual transformation in the fall and at	Advent	decided	the family
8	PHIL	, the wildest , one might even say the most revolutionary	Advent	hymn	ever sung
9	PHIL	in the morning but pray ? And so each morning that	Advent	I	walked an
10	PHIL	Jesus alive and anew . The signature text and image of	Advent	in	my Swedish
11	PHIL	reported attending Sunday Mass as a family , observing Lent and	Advent	in	the home

Figure 3. Corpus examples displayed for *advent*. Davies (2013) retrieved February 18, 2019, from www.wordandphrase.info/academic/analyzeText.asp. Used with permission (Appendix B).

Components of Selection that Succeed Corpus Analysis

Townsend and Kiernan (2015) make the point that using the Word and Phrase Tool (Davies, 2013) does not replace the need for teacher discretion in item selection. This can already be observed in the need for teacher judgement based on word usage examples from corpora. The need for discrimination additionally extends to decisions that are made based on factors beyond what can be known from corpus analysis. This does not mean that the selection process becomes purely arbitrary at this point. There are important things to consider that uphold the empirical nature of the entire model for selection. At the beginning point of selection that goes beyond what is provided by corpus analysis, a list of qualified high-frequency academic terms that are found in a selected text exists. All of these terms could be considered worthy of inclusion for direct instruction under the right conditions. The point of selection, however, is not to produce a list of terms in isolation, but to facilitate contextual vocabulary instruction that is appropriate to student learning. Therefore, contextual usage and student prior knowledge are key considerations. Another aspect of the empirical nature of the model is that all methods for narrowing item inclusion involve data, though there is a bit less specificity at these latter stages. As various options are available, depending on the degree of precision desired, instructors should balance time stewardship into the equation of determining what is most appropriate.

Selection of items based on relative importance to specific texts. As discussed in detail in the first chapter, increased vocabulary knowledge may affect immediate text comprehension (see, for example, Wright & Cervetti, 2016). Therefore, it is reasonable

to narrow item selection by factors related to how identified terms would likely enhance student understanding of selected texts. One means of judging this is by item repetition, which is, in fact, beneficial for a couple of reasons. The repetition of a word within a particular text is a potential indicator that the word represents a concept that is important to the text's central meaning. As established by research, repeated encounters can also increase a reader's likelihood of acquisition (Cooper, 2016; Nagy et al., 1985) and depth of understanding (Bybee & McClelland, 2005; Perfetti, Wlotko, & Hart, 2005). As a text or series of texts are entered into the Word and Phrase Tool (Davies, 2013), an instructor might keep a tally of occurrences of terms and give selection preference based on this frequency.

A second consideration of the relative importance of a word is its function in a passage. For various reasons, one identified item can play a more important role than another in communicating themes of a text. Consider, for example, the following sentence from an authentic text that includes two identified high-frequency items: “‘The *elimination* of the use of *persistent* toxic pesticides should be a goal,’ the investigators concluded” (emphasis added; Davidson et al., 2015, p. 405). If students understood the meaning of the verb *elimination* and the direct object *pesticides*, they would likely be able to paraphrase that the investigators wanted to get rid of certain chemicals, even if the adjective *persistent* was not understood in context. By analyzing the sentence in the Word and Phrase Tool (Davies, 2013), one would discover that *elimination* occurred over 2,000 more times in the academic subsection of the Corpus of Contemporary American English (COCA; Davies, 2008-) than *persistent*, giving additional credence for selecting

elimination and eliminating *persistent* in a case where narrowing instructional items was deemed helpful.

Excluding contextually technical items. There are occasions in which items that meet the criteria for high-frequency interdisciplinary vocabulary, as analyzed by the Word and Phrase Tool (Davies, 2013), are encountered contextual where usage is very discipline-specific. For example, the identified term *negatively* occurred less frequently in scientific texts (0.6 per million) than in some of the other disciplines (for example, it occurred at a rate of 2.9 per million words in sociology). While *negatively* collocates with *affected* and *related* in other disciplines, it frequently appears with *charged* in science-related texts (for example, it may be used to describe the charge of an electron; Davies). If the identified term occurred in an instructional context reflecting the technical scientific meaning, the term would need to be excluded as an interdisciplinary item (though it could be included as part of the disciplinary curriculum).

Selection of items based on student prior knowledge. Prior knowledge assessment is a common practice in education (Guskey, 2018; Mokhtari, Rosemary, & Edwards, 2007) that has been found to be effective at the post-secondary level (Glass, Brill, & Ingate, 2007) and serves a very valuable function in vocabulary instruction. The degree to which individual lexical items contained in a text are known or unknown by students prior to reading that text gives a good indicator of the relative importance of instruction related to each item. There are a variety of potential purposes and methods of assessment—a topic that is explored further in the fifth chapter. My aim in the present

discussion is to describe one model of prior assessment that is time-effective and therefore particularly helpful as a component in the item identification process.

The Vocabulary Knowledge Scale. Paribakht and Wesche (1992) have popularized a method of student self-reporting of word knowledge called the Vocabulary Knowledge Scale (VKS) based on Dale's (1965) original concept (also see Bruton, 2009). The approach involves a student self-assessment of knowledge of individual items on a scale on five levels of understanding. The following is my adaptation of the levels of the VKS (Wesche & Paribakht, 1996):

1. This is the first time I have seen this word.
2. I have seen this word, but don't know much about it.
3. I have some information about the word—possibly including morphological knowledge—but am unable to define it.
4. I understand what this word means.
5. I could explain this word and use it in speech or writing.

Wesche and Paribakht (1996) have created an added component to the VKS that factors in student performance data, which is addressed in the fourth chapter in the section discussing assessment. Even with this addition, the method has some limitations for monitoring vocabulary growth (Bruton). However, the model can be used to gain helpful information on student prior knowledge of words—even when only using the part of the method designed to obtain perceived knowledge. The effectiveness of the approach is supported by Wesche and Parbakht's finding of strong correlations between

student self-assessment and behaviorally demonstrated knowledge (the lowest level found was $r = .92$). Figure 4 presents an adapted version of the VKS that I have used in reading support classes. The most striking modification that I have made to Wesche and Parbakht's model is added language at the third level that highlights morphology as a means of inferring meaning.

The scale presented above closely mirrors a second version that I have taught students to use as an evaluative strategy for contextual word encounters. Since here it is presented as a pre-assessment, it does not consider context. In the contextual version, the third level indicates that a student's lexical access may be a product of morphological word recognition *or* contextual clues. At the fourth level of the contextual version, a student affirms the ability to comprehend a term in the context in which it was presented, but not confidence in an ability to explain the word in varying contexts or to use the word productively. The benefit of my adapted versions over the model designed by Wesche and Paribakht (1996) is that my modifications highlight elements of vocabulary depth as indicators of levels of comprehension.

The Vocabulary Knowledge Scale (VKS; Wesche & Paribakht, 1996) has been further adapted by practitioners, as shown in Figure 4, so that students are trained to indicate levels of word knowledge by holding up an appropriate number of fingers, typically referred to as *fist-to-five* (see, for example, Flanigan et al., 2011). While this method of data collection is a bit imprecise, it is a useful means of rapidly obtaining assessment information. If a class generally indicates strong item knowledge (average

rating at level four or above) an instructor can assume that attention is better directed toward terms with lower student knowledge ratings.

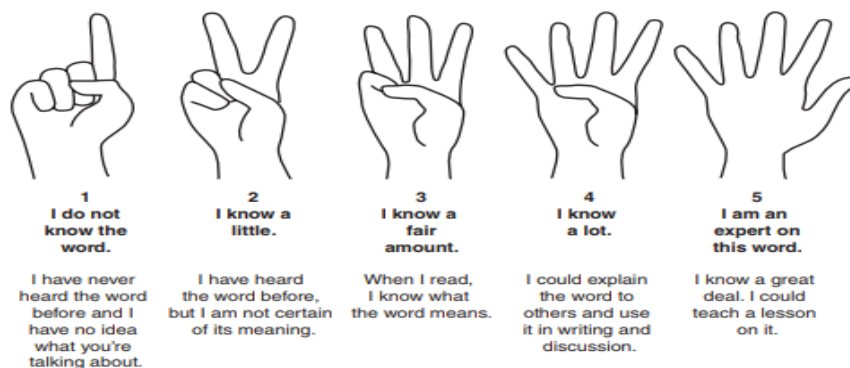


Figure 4. Fist-to-five rating scale (Flanigan et al., 2011, p. 244). Reprinted with permission of Pearson Education, Inc., New York (Appendix C).

In the instances where an educator intends to collect a sample of pre and posttest data to determine specific gains, this final selection step would need to be more elaborate, as discussed in the assessment section of the fifth chapter. While prior knowledge testing and pre-assessing to measure student growth can overlap, they are not identical. In my opinion, the latter should be done periodically to gauge the general effectiveness of instruction. However, because the goals of vocabulary instruction are to increase immediate text comprehension and to have long-term effects on reading comprehension, testing each instructional item is not necessary. Overburdening instructors or students with vocabulary testing could be counterproductive.

Putting the Selection Process Together

While I have provided a fairly lengthy discussion that explains the various facets of consideration for item selection, the process itself is uncomplicated. In summary, the process involves scanning a selected section of text into the Word and Phrase Tool (Davies, 2013) and choosing the correct options in order to retrieve color-coded output of high-frequency items that yields information about their occurrence and usage in academic texts. Individual word sketches can be used to find the frequency of occurrence in each included discipline, words that collocate with a selected item, and usage as exemplified in corpora. The next steps involve using textual and student information to determine which items will be targeted for instruction.

Examples of Results of the Selection Process

It is important to provide some actual results of the item selection process with contextual and corpus analysis in order to demonstrate the model's effectiveness in identifying items that occur frequently across disciplines and address potential challenges that are revealed by the results. Table 1 displays items identified from sections of two textbooks that, at the time of writing, were regularly used in courses that fulfill general education requirements at Middle Tennessee State University (MTSU).

The selection from each textbook is a designated section of a chapter ranging between six and seven pages (which, in both cases, included text and graphic representations). History text examples come from the textbook of a course linked with reading support classes. The history text selection is a narrative presentation of events in the late 1800s (Davidson et al., 2015). The second text is a section from a biology

textbook that discusses the regulation of enzyme activities (Sadava, Hills, Heller, & Hacker, 2016). The process of item selection discussed in this chapter was used with one exception. As the presented terms are used representatively, and were not part of class instruction, researcher discretion was used in place of evaluating student prior knowledge.

A few interesting observations can be made about these sample lists (see Table 1 below). Only one term in the history selection and two items in the biology selection occurred more than once within a text specific section of text. Although academic language typically has a high density of nouns (Nagy & Townsend, 2012), based on usage in the representative texts, only five terms (all from history) functioned as nouns (Davidson et al.; Sadava et al.).

Similar items between texts. There are items on each list that appear to have similar counterparts to items on the other. If it were the case that items in the sample demonstrated actual interdisciplinary use of words, this knowledge would be of particular interest. It is also true that differences between the disciplinary occurrences give useful information because they speak of the extent to which transfer of vocabulary knowledge could occur between two authentic texts. There are limitations to this approach, however. Only two small samples of text were considered, which gives limited opportunity to observe interdisciplinary item occurrences. A reading of each text would suggest that the genres of writing vary greatly (Davidson et al., 2015; Sadava et al, 2016). While this is an important consideration related to interdisciplinary vocabulary, one could certainly find disciplinary texts on a university campus that were more akin to either genre.

Table 1:
Items from Identification Sample

History Text ^a	Occurrences	Biology Text ^b	Occurrences
Catalyst*	1	Activating	1
Civilization	1	Adjacent	1
Cultivated	1	Altered	3
Ideals*	1	Ideal*	1
Interdependence	1	Interdependent *	1
Mediation	1	Optimal	1
Monetary	2	Relative	1
Ostensibly*	1	Replicate *	1
Prevailing*	1	Sequentially	1
Resolve	1	Via *	5

Note: * Denotes item analyzed in body of study (a) Davidson et al., 2015, pp. 425-431
 (b) Sadava et al., 2016, pp. 163-168

Ideal(s). The term *ideal* appears to have occurred in both disciplinary texts based on the grouping methods of Gardner and Davies (2014; inflectional differences only). However, based on the contexts of occurrence in the represented texts, there are definitional differences between the exemplars that also represent different parts of

speech. As a result, these terms are not included in the same word frequency or discipline frequency counts in the Word and Phrase Tool (Davies, 2013).

In the history text (Davidson et al., 2015), the term *ideals* is used as a plural noun—the singular form means “a principle that states a high standard for behavior” (Cambridge Dictionary, 2019). The term *ideal* occurs twice in the biology text (Sadava et al. 2016) where, in each case, it functions as an adjective. The in-text gloss provided for the second occurrence, “optimal” (Sadava et al., 2016, p. 169), is a synonym that is applicable to both occurrences in the biology text.

- *Context in history*: “Watson, who began with such high political *ideals*, gained power only by abandoning them” (emphasis added; Davidson et al., 2015, p. 429).
- *Context in biology*: “This makes DFR an *ideal* target for an anticancer drug” (emphasis added; Sadava et al., 2016, p. 164).
- *Context in biology*: “Each enzyme is most active at a particular pH; its activity decreases as the solution is made more acidic or more basic than the *ideal* (optimal) pH...” (emphasis added; Sadava et al., 2016, p. 168).

The connected meanings, or senses of the word, demonstrate that these terms represent an example of nominalization—the adjective has been transformed into a noun with a linked meaning. The question, in this instance, as to whether instruction based on item occurrence in one text would transfer to student comprehension in the other cannot be adequately addressed without evidence as to whether polysemous meanings can be

gained from contextual instruction. An argument for the inclusion of polysemy as a component of instruction is presented in the fourth chapter. The noun *ideal*, however, is independently a high-frequency term, as identified by the Word and Phrase Tool (Davies, 2013).

Interdependence and Interdependent. The noun *interdependence* is formed by nominalization from the adjective *interdependent*. These terms would fit under the same heading based on Coxhead’s (2000) methods since they are part of the same word family. However, in the selection process described in this study they are treated as separate items—the morphological differences are derivational, making them separate lemmas. The meaning of the term *interdependence* as it occurred in the history text (Davidson et al., 2015) can be derived from a definition of *interdependent*, which is an adjective that describes “...two or more people or things that rely on or are affected by each other” (YourDictionary, 2019). Yet, *interdependence* occurred almost 1.5 times more frequently than *interdependent* in the academic subsection of the Corpus of Contemporary American English (COCA; Davies, 2008-)—a testimony to the frequent use of nominalization in academic texts.

- *Context in history*: “The new order had brought prosperity by increasing the production, opening markets, and tying Americans closer together. But in 1893 the cost of *interdependence* came due” (emphasis added; Davidson et al., 2015, p. 425).

- *Context in biology*: “Computer algorithms are used to model these pathways and show how they mesh in an *interdependent* system...” (emphasis added; Sadava et al, 2016, p. 163).

These examples demonstrate the importance of focusing on academic language features as well as vocabulary depth, particularly as morphology and nominalization would be part of either discussion. In this particular case, the terms share two morphological units (*-inter* and *depend*) that are transparent in the meaning of each term. Although the contextual use of the terms differs greatly between disciplinary texts, the integrity of the meaning of *interdependent* is stable. The morphological difference between the items can be observed in several other examples that students could generate or discuss (for example, *intelligent/intelligence*, *magnificent/magnificence*). Basing direct, contextual instruction on either term (*interdependent* or *interdependence*) could have benefits that would lead to a better representation of the other term, when encountered, as well as a greater understanding of how morphologically complex academic terms can function and be understood.

Catalyst (and catalyze). In the original Word and Phrase Tool (Davies, 2013) analysis of scanned pages of the biology text the term *catalyze* was identified. This was an interesting find since the term *catalyst* occurred in the history text. As part of the same word family, these terms would be considered under the same heading according to Coxhead’s (2000) scheme, although they do not actually appear on the Academic Word List (AWL; Coxhead, 1998). There is an obvious relationship between the nominalized

noun *catalyst* and the verb *catalyze*—a *catalyst* starts or speeds a reaction, or *catalyzes* something.

The term *catalyzed*, as it appeared in the biology text, however, has a technical meaning that is specific to scientific literature (Sadava et al., 2016). The Word and Phrase Tool (Davies, 2013) presented one definition for *catalyze*, but two definitions for the noun *catalyst*, one that relating to the technical scientific use and the other more general (as represented by the use in Davidson et al., 2015). Since the use of *catalyze* in the biology text was discipline-specific, it was excluded from the sample. If *catalyst* were to be used in a similar sense, it would need to be excluded as well. I have chosen to retain the term in this analysis, however, so that I could use it to catalyze an interesting discussion.

- *Context in history*: “The Democrats controlled little but the South. And the Populists virtually vanished but not before leaving a compound legacy: as a *catalyst* for political realignment, a cry for federal action, and a prelude to a new age of reform” (emphasis added; Davidson et al., p. 429).
- *Context in biology*: “Such activation is reversible because another enzyme called protein phosphatase can *catalyze* the hydrolysis and remove all phosphate groups...” (emphasis added; Sadava et al., 2016, p. 176).

The differing senses of *catalyst* would seem to bolster the case of the discipline-specific nature of vocabulary (see Chapter Three). However, based on what can be gleaned from corpora, there is a good argument for the benefit of teaching *catalyst* (as it appears in Davidson et al., 2015) as a high-frequency term. Though it can be used in a

discipline-specific way in the sciences, *catalyst* occurred more frequently in the discipline of education than science (1.8 versus 1.7 per million) and was also well represented in law (1.0 per million), the humanities (1.0 per million), and history (1.0 per million; Davies, 2013). Examples from the academic subsection of the Corpus of Contemporary Academic English (COCA; Davies, 2008-) demonstrated that occurrences in scientific literature represented a mix between the meanings—sometimes the general sense of “something that causes an important event to happen” was implied, and in other occurrences it represented a chemical change (Davies, 2013). The occurrences in disciplinary literature outside the sciences showed consistency in meaning and collocation. Particularly, *catalyst* was shown to collocate with *for* and, often these terms occurred with *change* (*catalyst for change*).

An additional issue to consider is the fact that polysemy implies related meanings. It is conceivable that a deep understanding of *catalyst* as an agent of chemical change could lead to a flexibility of representation that would strengthen an understanding of the term as it is used in relationship to social change (or vice versa). Whether or not this is the case, the fact that all of this information about the word was obtained easily using the Word and Phrase Tool (Davies, 2013) demonstrates the power of the technology available. In this case, it was not only helpful to understand that a discipline-specific sense of the term *catalyst* might create some confusion, it was also helpful to have an empirical means of determining that the more generalized sense of the term has the credentials, based on occurrences in corpora, to warrant consideration of its own.

Individual exemplars from each sample list. In the instances where there was not a comparable occurrence identified in one authentic text to an item identified in the other, examples from corpora as well as use of other features of the Word and Phrase Tool (Davies, 2013) exclusively provided reliable evidence as to whether or not identified items could be considered to be part of an interdisciplinary academic vocabulary—and this is the better evidence in any case. Whereas comparing usage in textbooks from required courses at the same university carries a sense of authenticity (students could actually encounter both), corpus data presents a larger picture and demonstrates usage in a wide variety of contexts. I have selected items to analyze that varied in grammatical function, frequency, polysemy, and my pre-selection-process impressions as an instructor in order to give transparent and broad illustrations of what can be learned about items through the presented model of identification.

Prevailing—an adjective that describes abstract nouns. The item *prevailing* is most frequent in the disciplines of law (1.7 occurrences per million), history (1.6 occurrences per million), and the humanities (1.1 occurrences per million; Davies, 2013). Within the presented context, the implied meaning seems to be reflected in the definitions “existing at a particular place or at a particular time” (Cambridge Dictionary, 2019) and “...most common...” (Vocabulary.com, n.d.). Though it is not as frequent in occurrence (nor included in the Academic Vocabulary List; Davies & Gardner, 2013), *prevailing* can also occur as a present participle of the verb *prevail*.

- *Context in history*: “Wells’s campaign focused on mob violence, but another former slave, Booker T. Washington, stressed, instead the need for accepting the *prevailing* framework for race relations...” (emphasis added; Davidson et al., p. 430).

The adjective collocates with several terms including *condition*, *attitude*, and *theory* (Davies, 2013). Hence, the context in which the term occurred in the history passage (Davidson et al, 2015) seems obscure. In fact, based on a scan in the phrase tool component of the Word and Phrase Tool interface, there were no examples of the co-occurrence of the term *framework* in the academic subsection of the Corpus of Contemporary American English (COCA; Davies, 2008-).

Like many of the corpus examples displayed in the Word and Phrase Tool (Davies, 2013), the noun—*framework*—being described represents an abstract concept. The following examples from corpora illustrate this phenomenon: a) “...he refused to accept the *prevailing* social order as natural and inevitable...” b) “The firm went against *prevailing* wisdom and committed heavy outlays of cash...” (emphases added; Davies). These two examples illustrate additional themes that run through the examples from corpora: Many of the nouns described by the item *prevailing* are types of social construct (for example, *ethos*, *order*, and *stereotype*)— note that *framework* fits this category—or terms representing human thinking (for example, *attitude*, *opinion*, and *wisdom*; Davies). Since the language structure presented in the history selection (Davidson et al., 2013) is representative of what is found in corpora, there is a good case for including this term as used in the encountered context in interdisciplinary academic instruction. In so doing, it

would be interesting to explore the ways that the item is typically used to describe abstract nouns.

Ostensibly—an adverb that defied appearances. The term *ostensibly* seemed to be a questionable item for inclusion based on intuition alone. Compared with items reviewed in this section, it occurred less frequently than most others in the academic subsection of the Corpus of Contemporary American English (COCA; Davies 2008-)—yet, it had more occurrences than *interdependent*. Perhaps the item might seem rare due to relative differences in proportional occurrence by discipline. The item was most frequent in humanities texts (2.4 per million) with strong representation in history and law texts (Davies, 2013). On the other hand, the term was comparatively rare in education, science, medicine, and business. While these discrepancies would seem to support the notion of imbalance among disciplines (as discussed in the third chapter), it is noteworthy that the term still met my standard of at least one occurrence per million words in at least three disciplines (in five disciplines, in this case), as discussed in the section of this chapter on selection based on likelihood of future encounter.

- *Context in history:* “*Ostensibly* directed at African Americans, these campaigns also had a broader target in the world of politics: rebellion from below, black or white” (emphasis added; Davidson et al., 2013, p. 429).

An issue to consider regarding the term *ostensibly* as it is used in the above selection is its relative contextual importance. While the item functions as an adverb, which would often be less important for comprehension than a noun or verb, failure to

understand the term in context would leave the reader wondering what the nature was of the direction of the campaigns toward African Americans.

In examples from corpora, this item did not seem to form significant tight collocations; the most frequent item to follow *ostensibly* in corpus examples was the preposition *to* (Davies, 2013). The definition feature in the Word and Phrase Tool (Davies) only provided one meaning, “from appearances alone,” which was consistent with other dictionaries (see, for example, Oxford Living Dictionaries, 2019). This understanding would appear to be applicable to the corpus examples: a) “The coverage *ostensibly* had to do with the earthquake damage in Sydney;” b) “...the legislation *ostensibly* promoted the search for truth...” (emphases added; Davies).

The argument for including this term as an instructional item includes not only the fact that it meets all set qualifications, but also that it would seem to help with immediate text comprehension. Additionally, the occurrences across the corpora examples support consistency of meaning. The fact that I, as an instructor, did not initially perceive this as an item worthy of inclusion attests to the power of using empirical methods of analysis instead of mere intuition.

Relative: A term with related polysemous meanings. There are at least four general meanings associated with the term *relative*. Two define the noun form and indicate common ancestry, either more immediately of a person (one’s cousin, for example) or a plant or animal that shares a common genus with another (Davies, 2013). The noun form occurred much less frequently in the academic subsection of the Corpus of Contemporary American English (COCA; Davies, 2008-) than the item occurred as an

adjective (4,310 versus 7,740). In the context presented below, the term indicates a manner in which one entity relates in size or degree to another (Davies, 2013). Another possible use of the adjective indicates that something is not absolute or complete (Davies).

- *Context in biology*: “In this case, the degree of inhibition depends on the *relative* concentrations of the substrate and the inhibitor” (emphasis added; Sadava et al., 2016, p. 164).

This exemplar raises the question as to whether a term that has relatively high frequency and multiple meanings can be taught effectively. While the Word and Phrase Tool (Davies, 2013) separates terms by lemma, it does not account for the finer issues of polysemy. Where specificity is required in order to understand usage, it is necessary to look at several examples from corpora. A review of these examples indicates that the use of the adjective as it appears in the biology text (Sadava et al., 2016, p. 164) can typically be identified based on co-occurrence of items that refer to forms of measurement (Davies). Whereas the context of the term in the biology text discussed *relative concentrations*, other examples included the words *amounts*, *cost*, *effects*, and *size* (Davies). Both possible implied meanings of the adjective occurred throughout the scientific literature and in texts within the discipline of sociology. In medicine, the comparative sense of the term appeared more frequently, and in history, education, and law, the adjective more frequently represented the idea of something being non-absolute (Davies).

There are good arguments for teaching the term *relative* as it appeared in the authentic student text. Although it is not possible, with the tools being used in this study, to determine the frequency at which the term has been used to indicate each possible meaning, the high-frequency of the lemma in general (the adjective occurred approximately eight times as frequently as *ostensibly* in academic texts; Davies, 2013) indicates a strong likelihood of repeated encounters of the item where the meaning will be similar to what was found in the student text. Using the findings discussed, an educator would have enough knowledge about the word's frequency, disciplinary usage, and collocations to make informed decisions that were further based on theories about polysemy and transfer.

Via: An academic preposition. Referring back to the metric requirements that Gardiner and Davies (2014) placed on terms included in the Academic Vocabulary List (AVL; see the section of this chapter on finding a frequency range for selecting academic vocabulary), it is understood that any item on the list appears with significantly greater regularity in academic texts than in other types of print or spoken English. This is a significant issue when discussing a preposition—one might expect prepositions to be common to all speech and writing. Indeed, in the Corpus of Contemporary American English (COCA; Davies, 2008-), the items *in*, *on*, *through*, *with*, and *from* all occurred in the 500 most frequent words. *Via* does not, though it is still in the top 3,000 items. Yet, *via* is the term among the presented exemplars with the highest frequency in academic texts (7,492 occurrences in the academic subsection of the COCA; Davies). This demonstrates that the item is an important preposition to understand in building academic language comprehension.

The item *via* occurred five times in the selected section of the biology text (Sadava et al., 2016). Though the item is applied to very technical discussions, in each of the examples below it could be replaced either with the synonym *through* or *by* (Merriam-Webster, 2019). An examination of the examples in corpora provided on the Word and Phrase Tool (Davies, 2013) demonstrated that one of the same terms could replace *via* in most any instance.

- *Context in biology*: “Allosteric enzymes are controlled *via* changes in shape” (emphasis added; Sadava et al., 2015, p. 166).
- *Context in biology*: “Many enzymes involved in signal transduction are regulated *via* reversible phosphorylation...” (emphasis added; Sadava et al., 2015, p. 167).
- *Example from corpora*: “Data was collected *via* a Web-based self-report inventory” (emphasis added; Davies, 2013).
- *Example from corpora*: “...the model also encompasses a strong element of human dynamics *via* role modeling...” (emphasis added; Davies, 2013).

If the item were determined to be relatively unknown by students, the value of instruction for the potential benefits for text comprehension (both immediately in a text where the term had multiple occurrences and more generally) would seem apparent. Teaching the term based on the encountered contexts would seem sufficient for transferable knowledge.

Final Considerations Regarding the Outcome of the Selection Process

The discussions of particular items provides ample insight into the inherent challenges involved in using authentic texts from specific disciplines to select vocabulary for instruction that is interdisciplinary in nature. While, overall, the results offer a good case that there is benefit to the endeavor, there are nonetheless gray areas that call the approach into question in regard to the frequency and usage of specific terms. As I have clearly shown, an empirical approach does not negate the need for instructional decisions, but one of the positive benefits of the Word and Phrase Tool (Davies, 2013) is that, rightly used, it equips the educator to explore these decisions in a knowledgeable way. As part of the model, an item may be excluded based on any legitimate concern. It is plausible to think that the very process of examining authentic contexts and corpus data in regard to potential instructional items would enrich subsequent vocabulary instruction.

CHAPTER FIVE: BUILDING A CORPUS-BASED INSTRUCTIONAL MODEL FOR INTERDISCIPLINARY ACADEMIC VOCABULARY: PEDAGOGICAL METHODOLOGIES

This chapter details the second part of an empirical model for selecting and teaching high-frequency interdisciplinary academic vocabulary. It begins with the assumption that instructional items have been identified based on the process described in the fourth chapter. The vocabulary instruction format that I present here—called *item discussions*—facilitates instruction that has depth but is also time-conscious. In presenting the five aspects of item discussions, I explain how key research-based components of vocabulary instruction are addressed and demonstrate the continued importance that corpora play in informing instruction. I then give attention to models of assessment of learning and suggest applications for practitioners as well as possibilities for the assessment of research related to this model of instruction.

The Format of Instruction

Item discussions are direct vocabulary instruction delivered in five-to-ten minute (often preferably five) formatted exercises that can be inserted into explorations of text in university reading support classes. Each item discussion focuses on one identified term. The basic format can be used with types of terms other than interdisciplinary academic vocabulary, but the discussion and examples here will be focused on terms that could be identified using the previously described process of item selection.

The order of instruction connects with the sections on a graphic organizer that has been adapted for use with this model (Figure 5). Graphic organizers can be helpful in

arranging information in meaningful ways that demonstrate connections and relationships between concepts (Horton, Lovitt, & Bergerud, 1990) and have been found to be effective for vocabulary instruction (Al-Hinnawi, 2012). The organizer used in item discussions is an adapted version of the Frayer Model (Frayer, Frederick, & Klausmeier, 1969, as cited in Dunston & Tyminski, 2013). The sequence of instruction flows as follows: (a) some discussion of the text typically leads to focusing on the targeted item; (b) students are asked to use contextual and morphological clues to infer meaning; (c) students write the targeted word and copy some of the context in which it was found in the corresponding sections of the graphic organizer; (d) when applicable, students display a breakdown of a morphologically complex word in the center section where the word is written; (e) the professor guides the students in writing a working definition and/or synonyms in the appropriate labeled section; (f) students independently produce sentences using the term in a similar context where the same meaning is applied; (g) students share sentences; (h) the instructor conducts a brief final conversation about other contexts where the item might be encountered and polysemous word meanings.

Incorporating independent acquisition skill instruction in direct vocabulary instruction. An important benefit of a formatted model that includes a variety of methods of gaining comprehension of word meanings is that, in line with Craigo et al's (2017) research results, this model facilitates both direct and indirect instruction. The instructor teaches and gives students practice in research-based strategies that will be useful for incidental encounters. In fact, in the context of teaching university reading support classes, I use the same graphic organizer and structure for discussing discipline-

specific terminology and, at times, ask students to use this format to analyze interesting and challenging items that they find during independent reading.

Item Discussion Graphic Organizer	
Show the context in which the word was used.	Define this word as it is used in the given context.
"	
Create a new sentence using the same word with the same meaning	Give alternate meanings and other possible contexts for this word

Figure 5. Model item discussion organizer. Adapted from Frayer et al., 1969, as cited in Dunston & Tyminski, 2013.

Item discussions begin with authentic context. The optimal beginning point for vocabulary instruction is authentic text because vocabulary is only understood in context (Stahl & Nagy, 2006). Analysis of a term in context is three-fold: students can consider an item at the word level, sentence level, and discourse level. I will begin the discussion of the model at the discourse and sentence levels because the model being presented was designed for infusion into larger text-centered discussions that emphasize language features and context as integral aspects of word comprehension. In the course of actual instruction, elements of the considerations laid out here could come up at several points during an item discussion.

Contextual function in academic language. Categories of functions of academic language are useful when presenting item discussions. An illustration of how function might be brought into the early stages of an item discussion can be given using the term *conversely*. Based on information found using the Word and Phrase Tool (Davies, 2013), this term meets the qualifications for interdisciplinary academic vocabulary as described in the fourth chapter. An example of usage of the item from corpora is: “This brutal strategy conversely often resulted in the avoidance of unnecessary bloodshed” (Davies). *Conversely* is an adverb derived from the adjective *converse*, which in this context, indicates that something is “reversed in order...” (Meriam-Webster, 2019). In the context presented, the term could be replaced with the phrase *on the contrary*. Based on this knowledge, an instructor might ask students to explain the relationship between a *brutal* strategy and the avoidance of bloodshed. If students were able to recognize that the text presented a contrast, this would serve as a contextual clue for inferring the

meaning of the item *conversely* and would demonstrate how the term functioned within its context.

Another characteristic of academic language, discussed in the third chapter, that is worth consideration in approaching instruction is abstractness (Nagy & Townsend, 2012). There are two abstract nouns used in the following example from corpora: “The *power* of the flag by *necessity* is violent” (Davies, 2013). The term *necessity*, used here as an object of the preposition, is a high-frequency interdisciplinary academic term while the term *power* falls short in frequency (Davies). Students would be likely to understand *power*, however, as evidenced by the fact that it occurs in the top 500 words in the Corpus of Contemporary American English (COCA; Davies, 2008-). An item discussion focused on *necessity*, as it appears in this context, might begin by identifying the abstract nouns and using *power* as a model of what it means for a noun to be abstract—it is not possible to see the kind of *power* described, let alone the state of this *power*. Likewise, *necessity* is not something tangible but describes a state. Another discussion topic might be the role that the prepositional phrase plays in the sentence. If students were able to determine that the abstract noun *power*, in the context of the sentence, is described as violent, the instructor might ask, “What *power* is violent?” and, “What does the prepositional phrase tell us about the way that this *power* is violent?”

The examples given here illustrate the point that discussions of contextual meaning and the way that meaning is conveyed by language can be beginning points for discussions of specific words. In response to Laufer’s (2003) concern that students might make poor inferences about word meanings, as discussed in the third chapter, I contend

that practice working with functions of academic language has the potential of making students more astute in inferencing word meanings.

Instruction in morphology. Understanding morphemes as meaningful units is an important component of language instruction and this model. In the context of an item discussion, students are asked to look for morphemes that they recognize (bases or affixes), record them, and discuss meanings. This exercise is conducted under the professor's guidance so that correct information can be identified quickly—instructors should teach unknown morphemes to students as they are encountered. Since the instruction is contextual, the nature of each identified term determines the types of knowledge that are built in individual item discussions. Below, I offer brief attention to examples of morphologically complex words with Greek and Latin roots, which are common in academic language (Corson, 1997; see Chapter Two for a discussion of these concepts).

Teaching Greek and Latin Roots. Table 2 displays examples of high-frequency academic words that have Greek and Latin Roots. All appear on the Academic Vocabulary List (AVL; Davies & Gardner, 2013). The table provides the ratio of each term per million words in the academic subsection of the Corpus of Contemporary American English (COCA; Davies, 2008-) as well as information that would be helpful for instruction: morphemes, origins, and other items in which each identified morpheme occurs.

Table 2

High-Frequency Words Derived from Greek and Latin Roots

Target Item	Ratio	Origin language	Root*	Root Meaning*	Other words with same root
Autonomous	2.64	Greek	<i>auto-</i>	self, same	autobiography, automobile, automatic
		Latin	<i>-ous</i>	having qualities of	righteous, vigorous, miscellaneous
Individualist	2.23	Latin	<i>in-</i>	not	independent, indefinite, inconsistent
		Latin	<i>div-</i>	divide	diverge, divisive, diversity
		Greek/Latin	<i>-ist</i>	one who, that, which	chemist, socialist, activist
Manipulation	2.34	Latin	<i>Man-</i>	Hand	manuscript, manual, manufacture

Note: Ratio is rounded calculation based on frequency of academic terms in the Word and Phrase Tool (Davies, 2013). DeForest, (2000); List of Greek and Latin roots... (n.d); McEwan (2008), as cited in Reading Rockets, 2009.

The benefit of instructing students in Latin and Greek roots is that it aids student ability to take known morphemes from one context to construct meaning in another. For example, if students understood that the Greek root *auto-* refers to “self,” this knowledge would not only be helpful in a morphological analysis of the term *autonomous*, but would also help with the meaning of *autobiography* (a term that is typically encountered in the

context of reading support classes). The term *individualist* has a common Latin prefix (*in-*) that students would likely recognize from other known terms such as *independent*. If students were aware of the root's meaning, "divide," they would potentially use this for accessing the etymology of the adjective, which denotes a state of separation or distinction as a person or object—one being that is *not divided*. This knowledge could also benefit the study of several terms with the same Latin root, such as *dividend* and *diverse*. The suffix *-ist* would likely be familiar in relation to professions (artist, chemist, etc.), but could also be thought of in terms of someone who holds a particular view (socialist) or behaves in particular ways (activist).

The goal in the instructional model related to morphology is to hold a conversation that connects student prior knowledge with new information. The examples presented here give a sense of the types of information that are relevant, and that an instructor would need to prepare to for discussion. Once morphological information about a specific item is recorded on the graphic organizer, it remains available for future reference. Although items are taught based on incidental occurrence, a pattern of regular vocabulary instruction will result in a systematic approach to morphology. In this case, the system is not set up to cover all known roots and affixes, but rather to provide enough examples from authentic texts that instruction addresses the range of morphemes that students are typically encountering in assigned reading.

Instruction in definitions. The evidence for the use of definitions with university students, as mentioned in the second chapter, lends credence to the idea that definitions are important in vocabulary instruction (Craig et al. 2017; Nist and Olejnik, 1995). Even providing students with simple glosses can help with item acquisition (Jung, 2016).

There are three principles that govern the definitional portion of item discussions: (a) definitions should fit the context wherein the term occurred; (b) definitions should be understandable to the students; (c) students should be involved with discussions regarding the definition. The third principle helps to shape the way the first two are brought about. Instruction begins with conversations about meaning. While the instructor should have a prepared definition, student engagement will benefit learning and will empower students to practice strategies that will also be helpful for incidental encounters (Stahl & Nagy, 2006). Having thought about the context, students should be better equipped to determine if a provided definition (or one that they looked up) provides a sufficient understanding. Conversation with students will also help to ensure that the agreed upon definition is comprehensible.

Scott, Nagy and Finspach (2008) said, “If children do not already have some knowledge about a word, providing them a definition will enable them neither to use the word correctly in a sentence nor better understand text containing that word” (p. 187). While the present study focuses on a different population, Scott et al.’s statement points to problems with dictionary definitions—issues that likely plague learners at any level—and additionally raises concerns about learner uses of these definitions. In order to explore these considerations, the following example definitions were provided for terms

that have already been mentioned in this study as exemplars. The Google Dictionary (2019) was used to find the displayed definitions because this is the default when a student googles a word in search of a definition. No online dictionary has to be pulled up to gain this information,

- catalyst: “a person or thing that precipitates an event” (Google Dictionary, n.d.)
- autonomous: “denoting or performed by a device capable of operating without direct human control” (Google Dictionary, n.d.)

The definition provided for *autonomous* relates to a somewhat obscure use of the term, though corpora examples demonstrate this usage occurs in academic texts (Davies, 2013). An interesting aspect of each definition is that an item found within the definition occurred less frequent in the Corpus of Contemporary Academic English (COCA) and its academic subsection (Davies, 2008-) than the item being defined; *Catalyst* occurred more frequently than *precipitates* and *denotes* was less frequent than *autonomous* (Davies, 2013). This data could be used to predict that a student will have had less experience with an item in this definition than the term being looked up.

Regarding the potential for student misapplication, Nist and Olejnik (1995) provide examples illustrating the point that university students are susceptible to difficulties in gaining accurate understandings of terms from dictionary definitions. In one instance, a student used the definition of “...*anachronism*...defined as ‘the representation of something as existing at other than its proper historical time,’” to produce this sentence: “The student was suffering a serious *anachronism* by being put in a high level history class” (p. 177).

Since defining a term is seen as the instructional piece that bridges the gap between the item in context and producing a new sentence using that item, the model being presented requires that students have an accurate gauge (the definition) by which to evaluate the item's meaning and function in novel sentences. To accomplish this goal, it is imperative that the instructor maintains flexibility in wording the definition, and facilitates dialogue that ensures that understanding is communicated. While appealing to the authority of a dictionary is unimportant, the ability of students to explain what a term means is crucial. That said, using dictionaries in class, especially teaching students how to navigate online dictionaries that are easily accessible through phones with Internet service, is a valuable practice in which strategies for incidental acquisition are taught. If this method is used, it is very important that the example be set of comparing the chosen definition with the text for verification.

Instruction in synonymy. Synonyms can be used along with or in place of longer formal definitions. Using synonyms known to the students has been found to improve levels of acquisition (Webb, 2007). Alharbi (2015) found that building synonym networks was the most used strategy among a sample of non-native speakers of English, and that students held that viewing synonyms was more important than understanding meaning alone. One difficulty that Alharbi addressed was students attempting to find word meanings without relying on context. Synonyms, in fact, are easier to contextualize than definitions because students can insert a potential synonym into a sentence in place of a targeted item and judge the fit.

Replacing targeted items with synonyms seems simple, but has potential challenges. Moon (2010) used corpus studies to demonstrate the theory that there are no exact synonyms. This leads to important and interesting instructional conversations comparing possible word choices (why an author may have selected a particular item over a near synonym) in order to notice differences in degree, tone, or typical contextual usage.

Using thesaurus.com (2019), I searched the term *radical* and selected the definitional option, "...person who advocates significant, often extreme change." Among the optional synonyms (and near synonyms) that were retrieved were the items *extremist* and *progressive*. The term *extremist* reflects the notion of being outside of the mainstream. However, a review of examples from corpora suggests that label *extremist* is not typically used with positive connotations (Davies, 2013). The term *progressive* has historical links to movements in American history. While it would be possible to interchange *radical* and *progressive* in some cases (as can be observed in Davidson et al., 2015), and *radical* and *extremist* in other cases, there are ample conceivable contexts in which neither replacement would be appropriate and it is difficult to imagine a case where *progressive* or *extremist* could both be optional substitutes.

Like definitions, synonyms can serve as a bridge between understanding a term in context and production of a similar novel context. When previously known synonyms are identified that could be used interchangeably in the encountered context, those same synonyms can be imagined as guides for generating new sentences. The opportunity for

students to receive feedback regarding their production of synonyms and sentences will help build a sense of appropriateness of word choices.

Collocation and corpora in vocabulary instruction. Robust literature exists regarding collocation as it related to non-native language acquisition (see, for example, Peters; 2016; Snoder, 2017), but much of this literature deals with productive vocabulary, including terms used in writing, as opposed to receptive vocabulary (for example, Demir, 2017; Webb & Kagimoto, 2009). There is research backing the idea of incidental acquisition of collocation for non-native speakers (Hoey, 2005; Pellicer-Sánchez, 2017) as well as research supporting the claim that explicit instruction is more effective (Gheisari & Yousofi, 2016; Ördem and Parker, 2016). As is the case with vocabulary acquisition, the discussion of how collocations are learned need not be an either-or dilemma. There is insufficient literature regarding instruction in collocation outside of the studies focused on non-native speakers of English. However, when considering the possibility that students in university reading support courses have had limited quality to exposure to academic language, the use of instructional methods that strengthen student understandings of collocations seem worthy of exploration. As with other stages of the item discussion, instruction can be geared for the immediate acquisition of an item as well as the increase of student depth of understanding regarding how language works, which would logically benefit individual acquisition outside of direct instruction.

As Folse (2004) pointed out, vocabulary meanings are often discerned by collocates and a term used in one context may not make sense in another. Folse shared an example: *commit* collocates with *murder*, but using the same word meaning, one

would not “...commit a joke on someone” (p. 16). As was discussed in the sections of this chapter about definitions and synonyms, corpora play an important role in helping the educator prepare for instruction in collocation—it is important to help students have a sense of common contexts where collocations occur. Before students generate sentences that use a targeted item productively, it can be helpful to share a couple of examples from corpora and talk about contexts where the term would and would not commonly be used. Whereas Folse suggested favoring collocations in communicating word meanings to typical dictionary definitions, in the present model it is favorable to augment instruction after a definition (which itself is based on corpus research) has been established.

Using the Word and Phrase Tool (Davies, 2013), the instructor can identify collocates and examine related examples from corpora. The interface includes a function that allows the user to click on particular collocates of a term in order to rapidly retrieve these examples (Davies). While it may be helpful at some point to involve students in searching for collocates and corpus examples, in the interest of brevity, typically providing these is a sufficient approach. However, discussing examples in comparison with the context in which an item was encountered will offer students ways to think about collocation in incidental encounters.

Writing to solidify acquisition. In the sentence-writing portion of an item discussion, students use the corresponding section of the graphic organizer to create new sentences using the targeted item. The novel sentence should be similar in context to the one in which the item was encountered, and the item meaning should also be similar to that of the original context. If time permits, students may be encouraged to share

sentences, either by reading or by projected display. If sharing is not preferred due to time constraints, the instructor should read each sentence and respond with feedback.

Productive vocabulary, correctly understood, involves spoken or written generation of words (Schmitt, 2010), and writing tasks have been used to instruct and assess students in productive vocabulary (Lee & Muncie, 2006; Manyak, Manyak, Cimino, & Horton, 2019). The component of the item discussion in which students are asked to generate new sentences is not productive vocabulary in the proper sense. It seems, instead, to be similar to an aspect of what Graves (2006) called fostering word consciousness—a written activity that heightens student understanding of a term and its meaning (see also Baumann, Edwards, Boland, & Font, 2012). While there is not substantial research confirming the efficacy of students generating sentences to enhance vocabulary acquisition, researchers have suggested it as a viable model (Emberson, 2009; Young-Davy, 2014).

The writing procedure has four purposes: (a) it creates an opportunity for immediate assessment of understanding with the opportunity to provide feedback to avoid mis-education; (b) it facilitates further practice and engagement with the targeted item; (c) it gives a written record of student thought regarding the targeted item; (d) it potentially strengthens retention of knowledge (Emberson, 2009). It is important to distinguish the assessment of student understanding from assessment of the effectiveness of instruction for acquisition. The assessment that takes place in close proximity to direct instruction is only aimed at making certain that students have initial comprehension and does not offer any measurement of lexical acquisition.

Instruction in polysemy. Words can have multiple related meanings, and corpus analysis enables researchers and practitioners to gain a clearer sense of varieties of usage within different contexts (Szudarski, 2018). This capability has been demonstrated in the analyses of example items (see, for example the discussion of *ideal(s)* in the third chapter). Some studies have suggested incorporation of polysemy into vocabulary instruction (Garcia, Geiser, McCawley, Nilsen, & Wolterbook, 2007; Scott et al., 2008). Based on concerns raised by Hyland and Tse (2007) regarding different uses of words across disciplines and the desire to create a model of vocabulary instruction that promotes a kind of word flexibility that would maximize transfer of comprehension to varying disciplines, I have included methods for addressing polysemy.

The lower right quadrant of the graphic organizer (Figure 5) is dedicated to considering polysemous meanings and alternate contextual usage of targeted items. This, like other pieces of the model, is best carried out in brief conversation. Students may have encountered an item in other contexts and may have contributions for consideration. Based on review of corpora, the instructor should prepare examples that represent the most common alternate uses and be equipped to share ways that these uses fit into larger disciplinary contexts. For example, if the term *random* were encountered in a history text, a discussion of polysemy would likely include the technical use of the term in the disciplinary literature of science (and also mathematics), where the term collocates with *sample* (Davies, 2013). Examples of polysemy can be displayed visually and recorded by students, perhaps most easily by listing disciplines with phrases or collocations in bullet points following.

Can polysemous meanings be effectively incorporated in vocabulary

instruction? Incorporating polysemy into vocabulary instruction has potential pitfalls. A major concern is that attempting to acquire different definitions to a term simultaneously could overtax neural resources preventing the effective acquisition of either definition. This theory is based on research conducted on the relationship between working memory and reading difficulties (Rose & Rouhani, 2012) and the effects of working memory on vocabulary acquisition (Yang, Shintan, Li, & Zhang, 2017).

Though there are differing definitions of working memory, it is broadly conceived as the capacity to mentally store a limited amount of accessible information in order to complete a cognitive task (Adams, Nguyen, & Cowan, 2018). Differences in working memory have been found between struggling and typical readers at the K-12 level (Cain, Oakhill, & Lemmon, 2004; Rose & Rouhani, 2012) as well as for adults (Mellard, Woods, Md Desa, & Vuyk, 2015), and can have effects on the reading process for college students (Calvo, 2005). Working memory has further been found to be a significant factor affecting language acquisition for non-native speakers of English at the university level (Martin & Ellis, 2012; Yang et al., 2017).

The anticipated populations of students placed in university reading support courses include native speakers of English who have been identified as struggling readers and non-native speakers of English. Based on the research discussed, it is possible that inclusion of polysemy into already short item discussions would be counter-productive. On the other hand, if polysemous meanings could be effectively incorporated into an instructional method, the transferability of vocabulary acquisition to different disciplines

would be heightened, and students would gain a greater sense of how the English language works. Because the approach of incorporating polysemy is somewhat novel, experimentation is needed to determine the effectiveness of this approach.

Assessment of Instruction

All of the models of assessment discussed in this chapter relate to evaluating vocabulary acquisition, and not reading comprehension. As demonstrated in the findings of Elleman et al. (2009) and Wright and Cervetti (2016), and as discussed in the second chapter, vocabulary instruction is more apt to affect differences on researcher-designed comprehension tests than tests of general comprehension; it is unlikely that a test of general reading comprehension would be sensitive to gains from one term of instruction. A researcher-designed test of comprehension is beyond the scope of this study, however, as there are many facets of test design that affect validity and need careful consideration (Alderson, 2000). In the section discussing the direction of future research in the final chapter, I have included preliminary thoughts on developing measures for assessing the model's effects on comprehension.

There are three points at which assessment is used in the model for selection and instruction that is described in this study. The first use is in the context of selection, and was discussed in the fourth chapter. The second is the informal assessment conducted during and immediately after a lesson, as discussed in this chapter in the section devoted to student writing. The third need is assessment conducted by researchers or practitioners in order to evaluate the effectiveness of the instructional model and its delivery. This kind of testing can be conducted using occasional samples.

Since the purpose of assessment in the context of this study is to have a measure of acquisition of words that have been taught through direct instruction, assessment tools will need to be created by instructors or researchers. Various feasible options for assessment are available, each with benefits and limitations. An important consideration in selecting an assessment format is validity—the degree to which an assessment measures the desired construct. My consideration at this point is very practical. While formal measures of validity of instructor designed tests will not typically be feasible, some thought about design can help to determine if the desired types of word knowledge are being measured and whether unintended factors might be able to influence the outcome.

While researchers have often thought of vocabulary knowledge and assessment in terms of receptive versus productive knowledge, Read (2000) challenges this notion on the bases that a continuum model is a better explanation of vocabulary knowledge than dual categories and that there has been confusion as to what is meant by the terms *receptive* and by *productive*. Read offers more specific categories that can be helpful in thinking about test construction and validity. One set of categories is particularly helpful to this conversation: comprehension versus use (Read). Because the point in the present study is to deliver vocabulary instruction aimed at affecting reading comprehension (as opposed to written production), measuring vocabulary comprehension is preferable to measuring accurate use of terms.

Another consideration discussed by Read (2000) is the distinction between contextual presentation and testing words in isolation. While presenting context

potentially makes a test an assessment of reading comprehension skills and inferencing (as opposed to just measuring vocabulary knowledge), measurements where items are presented without context typically are not sensitive to polysemy and would invite students to define items according to various senses in which words can be used (Read).

One potential solution is a test of word associations (Meara, 2009). Meara designed a tests where productive associations were required, and based on this idea, Read (2000) conceived of a word-associates test in which associated words such as synonyms, collocates, and analytic words that express a component of a tested item are selected from lists. A difficulty with this approach is the possibility that test takers would not be familiar with items on the selection list, even when the targeted item was understood. Non-recognition of terms (other than targeted items) is also a potential issue with a test in which items are presented in context or any test where takers choose from provided options.

Because the primary goal for the assessment being discussed is to evaluate student gains, a pretest needs to be used so that posttest results can be compared. Especially if the texts are given in relatively close time proximity, reuse of the same test may be a confounding factor. Developing two different test versions that reliably measure the same knowledge is a task beyond the scope of the typical practitioner, and in fact would be very difficult in the context of educational research. Though other considerations need to be factored in, it is helpful to use tests that can be taken twice without a likelihood of confounding assessment results.

Free-response tests with contextual presentations. The model of assessment that was employed in the preliminary small-scale study presented in Chapter Six uses sentences that provide context for targeted items. Though the test taker is asked to produce definitions or synonyms, the test does not measure productive vocabulary, meaning here that it measures comprehension of the targeted items and not the ability to use them. Figure 6 demonstrates the format of the free-response assessment (see Appendix A for the full post assessment).

<p>Directions: For each item, tell what the underlined word means in the context in which it is used. Give as much information as is helpful to demonstrate what you know. If you use a different form of the underlined word in your description, explain what that word means.</p> <p>Sample: A benefit of the software is that it can <u>compensate</u> for flaws in older operating systems.</p> <hr/>

Figure 6. Free-response assessment directions and sample.

An asset of this testing model is that test items can be created fairly easily. An instructor or researcher simply has to select target words and the types of context and word meanings to test. The next step involves searching corpora using the Word and Phrase Tool (Davies, 2013) to look for examples of usage. The goal for each presented sentence is to represent usage of the item in typical manner, taking collocation into account. Test items should reflect language and terms (apart from targeted items) that would likely be understood by students. Test creators should select sentences that balance the need for understanding terms in context and for avoiding tight constraints that make meaning obvious. Complex sentences identified from corpora can be simplified.

The goal is to preserve the structure and phraseology of the context—additional material might be more confusing than helpful. Selecting desired contexts and word meanings allows instructors to test vocabulary comprehension based on contextual instruction. In order to gauge flexible word representation, targeted items may be presented in more than one test item with differing word meanings implied in each.

Scoring the free-response assessment. To score free-response test items, instructors use definitions from multiple dictionaries as exemplars by which to judge student responses. Definitions must match the sense implied for each word in the context presented in the test. Scoring student responses is difficult because it involves attempting to judge what test takers have written by objective standards. One concern is that students may use incongruent word forms in definitions. For example, in the small-scale study discussed in the sixth chapter, a student was attempting to define *dispersed* in a context where the term implied members of a crowd being separated. The student wrote, “break apart.” In my judgement, a difference in tense should not reduce a score based on the hypothesis that this error would not hinder a student from making sense of the word in context. If this assessment is to be used in further research, however, specific questions like this will need to be addressed. One way to reduce subjective inconsistencies is to score all class assessment sets twice. During the first scoring, decisions can be made about how to evaluate specific responses. The second scoring can be done to assure that all decisions related to range-finding have been implemented consistently.

When a test taker's definition gives an accurate sense of the item's meaning, the score of two points is given. A response that is partial, unclear, or presents an accurate definition that does not fit the context presented receives a score of one point. Figure 7 includes two sample questions from the assessment used in the small-scale study. Sample scoring is demonstrated for each test item with two-point, one-point, and no credit responses based on student data.

Sample 1: The government was asked to <u>compensate</u> Native Americans for resources and lands taken from them.
Response A: <u>repay</u> _____.
Score: 2
Response B: <u>pay</u> _____.
Score: 1
Response C: <u>care for</u> _____.
Score: 0
Sample 2: This may be the reason that people feel the need to <u>justify</u> themselves after a conflict.
Response A: <u>clear themselves</u> _____.
Score: 2
Response B: <u>to make more reasonable</u> _____.
Score: 1
Response C: <u>to not feel bad about wrong doings</u> _____.
Score: 0

Figure 7. Sample free-response test items and scored responses.

Evaluation of the free-response assessment. While this suggested model of assessment does not test productive vocabulary in the sense that a test taker does not need

to supply targeted items, it does ask students to generate terms that communicate the meaning of each targeted item. This is a potential weakness for the test's sensitivity because generative tasks are typically more difficult than multiple-choice tasks (Janssen & De Boeck, 1996). Another weakness is that limited options in scoring are not sensitive to wide variations in strengths of word representation. It may be the case that an alternative that is more sensitive to weaker word representations or less dependent on student expressive abilities would be a superior measure in detecting small gains.

Alternative forms of assessment: There are additional models that measure vocabulary comprehension and could be used for evaluation in the present model; each of these has some drawbacks. The major works of recent research on vocabulary test construction stem from the need to test non-native speakers of English (Read, 2000; Qian, 2002). Wesche and Paribakht (1996) categorized testing formats by the construct that is measured. Matching is a choice under the heading *recognition* and multiple-choice cloze tests are valid options that measure interpretation—the ability to analyze word meaning in context. Traditional multiple choice vocabulary testing presents an option, but as Read and Wesche and Paribakht pointed out, it is difficult to construct a good multiple-choice test. Another option is Wesche and Paribakht's Vocabulary Knowledge Scale (VKS), a model that has been widely recognized (see, for example, Read; Qian). Based on the need for periodically assessing comprehension of specific targeted terms in the context of university reading support classes, I discuss two recommendations.

Multiple-choice tests that use the cloze format. The typical cloze format for testing is a passage that has had items deleted on the basis of a fixed pattern (Read, 2000). Because the traditional cloze test is a measure of productive vocabulary, researchers have suggested a multiple-choice version (Read, 2000; Wesche and Paribakht, 1996). In contextual vocabulary instruction, targeted words may have been located in different passages addressing different subjects. Because of the desire to present authentic representations (discussed in the section of this chapter addressing free-response tests with contextual presentations), it is not advisable to attempt write a passage containing all of the targeted words. To remedy this dilemma, sentences based on corpora could be presented in a fashion similar to the free-response model, with the targeted word deleted in each. Near synonyms that do not fit the context could be selections as well as pseudo words (a strategy used to detect guessing; Read). Including more choices than the standard four would help decrease success rates due to deductive reasoning and guessing. An example is provided in Figure 8. Among the selections, options *b* and *e* are near synonyms and option *c* is a pseudo word. Scoring is objective and simple—one point is awarded for each correct response.

<p>Sample: This may be the reason that people feel the need to _____ themselves after a conflict.</p> <ul style="list-style-type: none">a. accommodateb. pardonc. legonomized. justifye. rationalizef. commend

Figure 8. Sample multiple-choice test item with cloze format.

Evaluation of multiple-choice tests that use the cloze format. Drawbacks to this model are apparent. Even with additional choices for selection, test takers may be able to use deductive reasoning to eliminate known options. Exposure to multiple-choice options makes the test-retest model less effective, as discussed earlier in the general discussion on assessment in this chapter. Additionally, selecting good alternate choices adds an extra problematic dimension of test construction that is not present in the free-response model. There are two alternate models that fit this category of testing. One possibility would be to provide a word bank with targeted items as well as distractors and (possibly) pseudo words. A second option would be to eliminate collocates from sentences so that students would supply these instead of supplying targeted items. Despite its limitations, this format of assessment possesses the positive characteristics of objectivity and ease of scoring.

Testing with the Vocabulary Knowledge Scale model. Wesche and Paribakht's (1996) Vocabulary Knowledge Scale (VKS) was the underlying format behind the fist-to-five method of student self-assessment presented in the fourth chapter. In the expanded version presented here, test takers report their own levels of understanding and additionally demonstrate item knowledge at the third level and above: When self-scoring at the third or fourth level, the test-taker is asked to provide a synonym. At the fifth level, the test taker writes a sentence to use the term productively. Wesche and Paribakht also added a footnote suggestion, based on their personal communication with Oller (1993), that a sixth level of the scale could be added to test flexible representation of word meaning. An example of a test item using this format is provided in Figure 9.

Scoring with the Vocabulary Knowledge Scale model. With the added category (Wesche & Paribakht, 1996), up to six points can be scored on each test item. The first two descriptors are based solely on self-reporting, and points match the scaled levels. At the third and fourth levels, corresponding points are given if an accurate synonym is supplied. If the synonym supplied is inaccurate, a score of two is assigned (Wesche & Paribakht). At the fifth level, a score of five is assigned for an accurate meaning and correct grammatical use of an item; a score of four is given if the sentence demonstrates correct word meaning but incorrect usage; a score of three is given if a correct synonym has been supplied but the item's meaning is not accurately reflected in the sentence (Wesche & Paribakht). Wesche and Paribakht do not give scoring directions for the sixth category, but I suggest that an additional point be added if at least one sentence for a polysemous meaning is written that would qualify for credit if it were used at the fifth level.

<p>Sample: compensate</p> <p>___ I. I don't remember having seen this word before</p> <p>___ II. I have seen this word, but I don't know what it means.</p> <p>___ III. I have seen this word before, and I think it means _____. (synonym or translation)</p> <p>___ IV. I know this word. It means _____. (synonym or translation)</p> <p>___ V. I can use this word in a sentence: _____. (If you do this section, please also do section IV.)"</p> <p>___ VI. The following sentences show all the meanings I can think of for the word.</p>
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Figure 9. Sample Vocabulary Knowledge Scale test item. Adapted from Wesche and Paribakht, 1996, Figure 1, Footnote 9.

Evaluation of the Vocabulary Knowledge Scale model. The Vocabulary Knowledge Scale (VKS; Wesche & Paribakht, 1996) is a promising option. Although it does have a productive component, this is only used at the point at which a student self-assesses adequate word knowledge. Since the difficulty with testing productive vocabulary is that tests are not sensitive to weaker item representations, the scaling of word knowledge represented in this model alleviates this concern. In fact, Wesche and Paribakht's model more accurately embraces the idea of vocabulary knowledge level as a continuum (Read, 2000) than any other model that I have presented. The VKS (Wesche & Paribakht) can be created with much greater ease than tests that require sentence selection and design or the generation of multiple-choice options.

There are limitations to the Vocabulary Knowledge Scale (VKS; Wesche & Paribakht, 1996). The scoring instructions, as presented, do not make a way to give or withhold credit based on use of the specific word meanings encountered in class instruction. This may limit the test's accuracy for measuring instructional vocabulary growth and make it less useful for research purposes. Ideally, however, the sixth level option would prompt test takers to include this meaning, if known, in addition to other senses supplied. Another concern is that scoring items at the fifth and sixth levels would pose the challenge of requiring instructor decisions similar to what is needed in scoring the free-response assessment. Finally, presenting individual items without context creates a testing scenario that is not consistent with the instructional format.

Final direction for assessment. Since no known test model perfectly fits the needs for assessing instructional vocabulary knowledge for university reading support

classes, a model should be selected that seems most suitable to an instructor or researcher's specific agenda and time constraints. The instructional model itself is new, and represents a unique contribution to the existing literature. As such, it would be expected that some trial experience is needed in order to identify and hone models that best assess desired constructs. Because the proposed models of assessment include pre and posttests, I presume that any of the models could be used as an indicator of effectiveness, especially if test-retest reliability is demonstrated to be strong.

Application of the Model in Diverse University Reading Support Settings

The model of instruction presented in this chapter was designed for the specific context of co-requisite reading support classes at a university. The associated methods have been drawn widely from research in the areas of kindergarten-twelfth grade education, language instruction for non-native speakers of English, and corpus linguistics. Because little empirical research exists for direct instructional models for the targeted population, adaptation of research from other populations has been applied. While university reading support courses vary in structure, the approach is applicable so long as sufficient amounts of authentic text are read in connection with the course.

Within university reading support classes, diversity of student demographics would suggest that research conducted among different populations may be more or less applicable to particular students. For example, a diversity of language backgrounds would indicate that research conducted with university students who are non-native speakers of English would be very applicable to some students whereas others would have more similarities to native speakers of English in American secondary education

studies. Students who are struggling readers would be, to some degree, represented in studies addressing students with reading difficulties, though age and the types of reading skills being assessed differ greatly in this broad category.

In order to establish the instructional model's effectiveness, experimental research is necessary. In the following chapter, I present the first results of such testing. There has been a reciprocal relationship between theory and practice. I used the structure of the model described in this study in my vocabulary instruction and the experience of leading this instruction has enabled me to offer a broader discussion of the components of the model.

CHAPTER SIX: PRELIMINARY SMALL-SCALE STUDY

In order to gain a working knowledge of feasibility and to obtain preliminary results of the effectiveness of the model for selecting and teaching high-frequency interdisciplinary academic vocabulary that is discussed in this dissertation, I designed a preliminary small-scale experimental study.

The study was conducted in the context of two reading support classes at Middle Tennessee State University (MTSU) taught by the researcher. The nature of the classes is described in the first chapter of the dissertation. Each class was linked to a section of History 2020, which explores American History between the time of Reconstruction and the present era. Two different faculty members taught the linked courses, but the syllabi and reading assignments were very similar. Identical reading passages were used in both classes for the experiment.

Method

Participants. The study was conducted with college freshmen, ranging of 19 to 46 years of age, in two reading support classes at Middle Tennessee State University (MTSU; $N = 18$, $M_{\text{age}} = 22$, $SD_{\text{age}} = 1.48$). Participants in each class were randomly assigned to a control or treatment group. Due to attrition, the choice of non-participation, and incomplete testing data, the final group sizes were unequal (there were eight participants in the control group and ten in the group receiving experimental instruction). The sample was composed of students from diverse language backgrounds. Participation based on language was not regulated since the diversity of students was generally representative of the population in MTSU's reading support classes. The study was

approved by the Internal Review Board of MTSU (Appendix D); the nature and design of the experiment was fully disclosed verbally and in writing, and written informed consent was received from each participant.

Materials and procedures. The procedures outlined in Chapter Four for item selection were used with the exception of the informal student survey of word knowledge, since a more precise measurement tool was needed for reporting research findings. The initial item selection process for high-frequency interdisciplinary academic vocabulary was conducted using the Word and Phrase Tool (Davies, 2013). Items were identified from assigned readings in a commonly-used history textbook (Davidson et al., 2015).

During a period of three weeks, the treatment and control groups each received approximately two hours of separately-conducted, text-based instruction. One class, that met twice a week, had four focused instructional periods where the experimental model was used for instruction with the treatment group. The other class, which met three times per week, had five similar instructional sessions in shorter timeframes. Instructional activities that were not related to vocabulary were conducted in a separate room with a graduate assistant during the times of research-focused instruction.

I provided instruction for the control group that included strategies typically used in reading support courses such as finding main ideas, summarizing, examining text structure, and making connections between the text and other sources of knowledge. Discipline-specific vocabulary was discussed, and students were encouraged to initiate discussion on any items that they found challenging. This made it possible that

interdisciplinary terms identified for instruction in the treatment group would be discussed within the control group's instructional sessions, though actual occurrences were rare. Instruction for the treatment group followed a similar pattern with the difference that interdisciplinary vocabulary items were directly taught during each session. The item discussion model described in the fifth chapter was used to format vocabulary instruction.

Measurement. Participants were given a researcher-designed vocabulary assessment in a pre and posttest model. The pre-test consisted of 30 items using 15 words drawn from student assigned reading and identified by the Word and Phrase Tool (Davies, 2013) as being between 501-3000 in ranking of frequency of occurrence in the academic subsection of the Corpus of Contemporary American English (COCA; Davies, 2008-). These terms are, as a result, included in the Academic Vocabulary List (AVL; Davies & Gardner, 2013).

The researcher-designed assessment format and scoring was based on the free-response model presented in the assessment section of the fifth chapter. Each item was presented in two formats; one presentation used a similar context and word meaning to what was encountered in reading (hereafter designated as instructional context) and one used differing contexts that implied polysemous word meanings (hereafter designated as transfer). The 20 items on the pretest with the lowest overall mean scores (for all participants) were selected for course instruction and comprised the posttest. The full post assessment is included in Appendix A, with notes differentiating the instructional content test items from transfer items.

The pre and posttests were given in two phases, with pretests preceding all instruction given for related words. The purpose of splitting the test phases was to achieve testing within available time frames and to avoid effects of test fatigue. Multiple examples from online dictionaries were used as exemplars for scoring, and the test sets were scored three times (and more on particular items) to ensure that evaluative decisions were universally applied.

Analysis. Based on the small sample size and unequal group sizes, the Kruskal-Wallis test for non-parametric analysis of variance was chosen to analyze differences between the control and treatment groups test scores. An online test calculator (Social Science Statistics, 2019) was used to conduct the analysis. Differences on individual test scores between the pre and posttest were found for the entire assessment and the subsections that contained the instructional context and the transfer test items. Significance of differences was determined at the $p < .05$ level. Additionally, Hedges g effect sizes were found for the effect of instruction on each type of item presentation and for the vocabulary assessment as a whole using an online effect size calculator (Ellis, 2009).

Hypothesis

I hypothesized that corpora-based model would be useful for identifying high-frequency interdisciplinary academic vocabulary in authentic college texts for instruction in university reading support classes and that direct instruction of these terms using a research-based model would be useful for student lexical acquisition of identified terms. I predicted that growth would be demonstrated in both the treatment and control groups

for instructional context items, however I anticipated that the treatment group would show significantly greater pre and posttest differences in this area. I did not have reason to suspect that the control group would demonstrate pre and posttest differences for transfer items, where I expected that the treatment group would have some differences. I anticipated a moderate group effect for instructional context items based on other studies that showed effects for direct vocabulary instruction (Craig et al., 2017; Elleman et al., 2009). I additionally anticipated a small group effect for the transfer test items, but there was no previous research on which to clearly base this prediction.

Results

The presentation of item discussions occurred mostly as expected. Some students showed particular enthusiasm for item discussions, especially the aspect where they were able to create new sentences using focus items and receive feedback as to whether their usage was accurate. Students showed varying degrees of understanding based on informal assessment of student writing due, in part, to time limitations. Some students demonstrated difficulties copying sentences that included targeted items in context and producing new sentences within the short periods allowed. Student verbal responses were typically more robust and vocabulary discussions were often rich.

Assessment results. As anticipated, mean posttest scores were stronger than mean pretest scores when all participants were considered (see Tables 3-6 below). Whereas both groups had positive pre and posttest differences for instructional context items, only the treatment group had stronger post than pretest scores on transfer items.

Table 3

Instructional Group Data by Item: Test Phase One

Item	Pre Context	Post Context	Difference	Pre Transfer	Post Transfer	Difference
exploited	3	9	6	4	4	0
spontaneous	4	7	3	0	0	0
advocate	7	7	0	4	7	3
preceded	1	2	1	2	8	6
tolerance	9	13	4	10	12	2
integrating	4	4	0	10	14	4
civilization	6	10	4	5	2	-3
embodying	6	6	0	6	4	-2
Ideals	7	6	-1	7	6	-1
moderate	5	3	-2	10	10	0
<i>Sum</i>	52	67	15	58	67	9
<i>Mean</i>	5.2	6.7	1.5	5.8	6.7	0.9
<i>Mean/student</i>	0.52	.67	0.15	.58	.67	.09

Note: *Mean/student* was found by dividing each item total by the number of students in the instructional (treatment) group ($n = 10$).

Table 4

Instructional Group Data by Item: Test Phase Two

Item	Pre Context	Post Context	Difference	Pre Transfer	Post Transfer	Difference
hence	4	10	6	10	11	1
accordingly	3	5	2	8	7	-1
compensate	9	12	3	7	5	-2
induction	7	8	1	1	3	2
hierarchy	7	8	1	3	6	3
experimentation	9	12	3	10	11	1
heightened	0	14	14	12	12	0
impersonal	0	7	7	0	4	4
Justify	5	12	7	6	11	5
submission	6	8	2	9	9	0
<i>Sum</i>	50	96	46	66	79	13
<i>Mean</i>	5	9.6	4.6	6.6	7.9	1.3
<i>Mean/student</i>	0.5	0.96	0.46	0.66	0.79	0.13

Note: *Mean/student* was found by dividing each item total by the number of students in the instructional (treatment) group ($n = 10$).

Table 5

Control Group Data by Item: Test Phase One

Item	Pre Context	Post Context	Difference	Pre Transfer	Post Transfer	Difference
exploited	3	4	1	8	6	-2
spontaneous	2	3	1	0	0	0
Advocate	3	5	2	9	3	-6
Preceded	0	3	3	1	1	0
Tolerance	8	7	-1	12	12	0
Integrating	7	5	-2	10	12	2
Civilization	5	7	2	3	1	-2
Embodying	3	2	-1	5	2	-3
Ideals	6	7	1	6	6	0
Moderate	8	7	-1	5	5	0
<i>Sum</i>	45	50	5	59	48	-11
<i>Mean</i>	4.5	5	0.5	5.9	4.8	-1.1
<i>Mean/student</i>	0.56	0.63	0.06	0.74	0.6	-0.14

Note: *Mean/student* was found by dividing each item total by the number of students in the control group ($n = 8$).

Table 6

Control Group Data by Item: Test Phase Two

Item	Pre Context	Post Context	Difference	Pre Transfer	Post Transfer	Difference
Hence	7	8	1	9	8	-1
accordingly	0	1	1	4	3	-1
compensate	6	5	-1	7	8	1
induction	4	11	7	2	4	2
hierarchy	8	9	1	6	8	2
experimentation	9	7	-2	11	12	1
heightened	4	8	4	10	10	0
impersonal	1	3	2	3	2	-1
Justify	6	6	0	8	7	-1
submission	8	6	-2	13	7	-6
<i>Sum</i>	53	64	11	73	69	3
<i>Mean</i>	5.3	6.4	1.1	7.3	6.9	1
<i>Mean/student</i>	0.66	0.8	0.14	0.91	0.86	-0.125

Note: *Mean* per student was found by dividing each item total by the number of students in the control group ($n = 8$).

The overall levels of pre and posttest differences between the groups approached significance (See Table 7 below). Strong group effects were found for vocabulary instruction for all tested items indicating general effectiveness of instruction. Group differences were not found to be statistically significant for instructional context presentations nor for transfer presentations. Effect sizes were moderate for instructional context presentations and for transfer presentations, suggesting some benefit of instruction for each.

Table 7

Results of Pre and Posttest Comparisons

Instructional Presentation	$F(1, N = 18)$	p	Hedges g
All items	2.70	.10	.95
Instructional context	1.15	.14	.73
Transfer	1.55	.21	.65

Discussion

Overall, the small-scale experiment indicated the potential usefulness of the model. Instruction was received well by students. While no test result differences reached significance, a general data comparison of the instructional group and control

group pre and posttest differences reveals that there were benefits to instruction. Further, effect sizes for the direct vocabulary instructional model were moderate to strong.

Transfer to new contexts. The lowest effects and smallest differences in the study were found when comparing the control and treatment group's differences for transfer test items. However, the effect size of instruction based on the whole assessment was stronger than the effect size of the instructional context presentations only, meaning that group differences in performance on the transfer section contributed to the overall strength of instruction. Looking at the data, the control group obtained a slightly lower mean posttest score than pretest score in this section, indicating, essentially, that without instruction students learned nothing related to word meanings that they did not encounter—this was expected. Based on the facts that the instructional group's mean test differences were small for transfer items and that the negative mean representing the control group's score differences was figured into the effect size calculation, the results for the effectiveness of teaching polysemous word meanings are inconclusive.

Limitation based on sample size. The primary limitation of this experiment was the sample size. This likely accounted for the fact that significance was not found for any group differences, though effect sizes were moderate to strong. A wide range of mean differences between pre and posttest scores (-5 to 23) demonstrates that outliers could have easily affected results.

A second limitation, related to sample size, is that language backgrounds were not distinguished in this study. While making these distinctions was part of the original design of the experiment, delineating subsections of an already small sample did not

allow for accurate analysis of results. Based on the fact that quite a bit of research in the area of corpus-based vocabulary instruction has focused on non-native speakers of English (see, for example, Szudarski, 2018; van Zeeland & Schmitt, 2013), it is possible that the effects of instruction are different for learners of differing backgrounds. This information would be helpful to know for instruction in the context of university reading support courses with diverse populations, but would also benefit instructional settings that focus on non-native speakers. Finding effects without regard to language differences was, however, more important initially since students from diverse language backgrounds are included in university reading support classes.

Limitation based on duration. As a preliminary study, the timeframe of tested instruction was limited. The design of the model facilitates regular instruction through the duration of a semester. Since word selections are made from assigned texts, the incidental nature of item occurrence would make the longer course of instruction very much like the instruction conducted in this study. However, the benefit of more student practice with the model and its systematic components of instruction that are designed to increase vocabulary depth (for example, contextual analysis and morphology) might create increases in instructional effectiveness over the course of an academic term.

Limitation based on assessment model. As was discussed in the section covering assessment in the fifth chapter, the free-response model of testing poses greater challenges to students than other formats (Janssen & De Boeck, 1996) and may not be sensitive to small increases of levels of item representation. Consequently, other testing formats may have yielded stronger results and pre and posttest differences on a test

requiring students to generate definitions may indicate particularly meaningful vocabulary gains.

Based on the limitations discussed here, the results of this experiment can only give preliminary indications of effectiveness. They do, however, suggest the model's potential benefits for use in university reading support courses, particularly when the results are viewed in the light of the empirical nature of the model.

CHAPTER SEVEN: FINAL THOUGHTS AND IMPLICATIONS

In the final chapter, I contextualize the findings preliminary experimental study with the larger considerations for future use of the model. The research that I have conducted can be grounded in the paradigm of classroom-based action research (Convery, 2014), a paradigm that I briefly address. I advocate for specific directions of related research and discuss implications for further implementation in university reading support courses as well as other academic settings. While one goal of future research involves publishing for scholarly disciplinary communities, another goal is to create deliverable professional development modules designed to share methods with practitioners.

Implications of the Preliminary Study in Regard to the Model

Overall, the preliminary study suggests that the model of item identification and instruction presented in this dissertation has promise for continued use and wider adoption. Therefore, future research replicating the small-scale experiment presented here is appropriate as is research based on adjustments to the model which could be made according to differing interpretations of the formative literature.

Time constraints. As indicated in the results of the experimental study presented in the sixth chapter, it was difficult for some students to complete the graphic organizer associated with item discussions in the allotted time (the goal was five minutes per discussion). Therefore, when time is a factor, trimming of discussions or writing expectations will need to take place. One possible way to do this is discussed in relation to eliminating the polysemy component of the model.

The problem of polysemy. The most significant adjustment that I recommend to the model is removing, as an essential aspect of the approach, the step in instruction where polysemous meanings and different disciplinary contexts are taught. While the experimental results are inconclusive, they are not strong enough to balance concerns of time constraints and the arguments against teaching multiple definitions because of potential effects on overloading working memory (Rose & Rouhani, 2012; Yang et al., 2017) as discussed in the fifth chapter. One option would be to retain this component for future testing. However, I believe, a stronger argument can be made for testing the model without instruction in polysemy as a major component and then consider replacing the component after strong baseline data is collected and analyzed.

Removing polysemy from being a set step in item discussions does not limit the possibility of discussing the phenomena with students at opportune moments, especially when different meanings of the same item are encountered by a class over the course of a semester's reading. By taking this approach, students would gain an understanding of language and awareness that the same word may have different senses and different usage across disciplines. This goal could be met without giving potentially confusing information about most instructional items with limited time for processing this information.

Modifying the graphic organizer. In place of the section of the graphic organizer dedicated to alternative word meanings and contexts, I suggest returning to Frayer et al.'s (1969, as cited in Dunston & Tyminski, 2013) original idea of working with *examples* and *non-examples* in order to consider semantic relationships that help

with understanding the scope and usage of words. I suggest that this approach may increase the depth of vocabulary knowledge that students would gain. However, this additional piece of instruction could be seen as optional and used only as time allowed and when it was most appropriate based on individual items. In order to preserve the other elements of the graphic organizer, these categories could share one quadrant of the organizer.

There are several possible ways that the contrast of examples and non-examples might be explored in relation to instructional items. Though not given the attention in the relevant literature that the components already included in the item discussion model have been, researchers have mentioned the value of antonymy as part of vocabulary instruction (Al-Hinnawi, 2012; Stahl & Nagy, 2006). Meronymy—part-whole relationships—could be considered. As an illustration, a class might discuss *thesis* as part of an argument, but not part (hence, a non-example of) a quarrel. Hyponymy and hypernymy—types and larger classifications—could also be explored. A class might discuss the idea that *individualism* is a theory, but not a scientific theory.

Another possible use of this section would foster deeper instruction in collocation. The idea of using non-examples of collocation addresses issues that Nist and Olejnik (1995) presented regarding misuse of items based on definition or context alone. With collocation as a motif, non-examples could include words in contexts that seem to make sense based on definitional meanings, but are not true to common usage. An exemplary use of the term *analyze* (“examine methodically...”; Google Dictionary, n.d.) might be, “The class will *analyze* the data from the experiment,” whereas a non-example of

common use would be, “The doctor will *analyze* four patients this afternoon.” Instead of designating set formats for generating examples and non-examples, maintaining flexibility of use would allow instructors to select the most meaningful ways to think about each term.

Possibilities for Broader Implementation

As this study has drawn from all known areas of related research, the model could be adapted to suit the needs of upper elementary through high school, and more directly could be applied in community college settings. The primary needed adjustment for adaptation in a different setting would be in the area of item selection, where varying decision rules would apply to word categories in the Word and Phrase Tool (Davies, 2013). One simple adjustment for some grade levels would be to use the identified academic terms that appear within the first 500 words on the Academic Vocabulary List (AVL, Davies & Gardner, 2013). Another possibility for elementary instructors would be to use data from the entire Corpus of Contemporary American English (COCA; Davies, 2008-) and select frequent items that also have high occurrences in academic texts.

Direction for Future Research

Historically, classroom-based action research has been more concerned with process than product (Elliot, 1987), yet the concept of the teacher as researcher has merits for solving educational problems and investigating potential benefits for learners (Convery, 2014). In this sense, the present study represents the action research paradigm.

Moving forward, I hope to collect experimental data from classrooms of multiple faculty members, moving to a more traditional model of educational research.

Future analysis. In order to gain the power needed for substantial statistical analysis, I propose a multi-semester project where the study is replicated in several university reading support classes. With strong enough statistical power, a two-way ANCOVA would be appropriate, comparing posttest results while controlling for pretest scores with word type and group (treatment vs control) as the independent variables. If transfer representations were to be removed, word type would not be a factor in the study.

With a larger sample, planned comparisons should be made based on language background. In order to include information about language background in research, some decisions would need to be made regarding distinctions. While native and non-native speakers of English are reasonable general categories, non-native speakers of English may include students with a great deal of experience with the English language (for example, students who speak two or more languages at home and have attended American schools at all grade levels) and students with very limited experience speaking American English or reading materials that use academic English. Additionally, it is possible to have students in a sample for whom English is a first language, but whose primary language context has not been American English. Instructional effectiveness may vary based on all of these factors.

Reading comprehension assessment. Though not addressed in this study, a means of establishing effects on reading comprehension will be essential in future research. One way of moving forward with this recommendation would be to use the

Word and Phrase Tool (Davies, 2013) to analyze assigned student texts occurring later in a semester, looking for occurrences of terms that have been included in earlier instruction. Based on Alderson's (2000) recommendation that assessment conducted in the classroom should be intricately connected with the format of instruction, developing a small assessment based on a couple of passages of authentic text followed by the types of comprehension questions typically addressed in reading support courses is an important goal for the next phase of research.

Testing neurological responses. Another potential future study, in line with Frishkoff et al.'s (2010) studies of the effects of types of vocabulary training, discussed in the second chapter, would use electroencephalographic brain scanning (EEG) with event-related potential (ERP) paradigm to compare neural responses to vocabulary based on types of instruction received. The benefit of adding EEG data to behavioral measures is that neural response data can help to establish evidence for mental word representation based on the paradigm of Perfetti's (2007) Lexical Quality Hypothesis (LHQ). Correlations between neurological responses and behavioral data would be of particular interest.

Communication of Findings

One goal of the future research discussed in this chapter is to generate quality publications in academic journals of related fields. However, it is important to disseminate information on potentially beneficial pedagogical models in ways that are accessible to most practitioners. Therefore, a second means of planned communication is the creation of professional development modules that can be presented in a variety of

settings. A better understanding of the adaptations needed to optimize the effectiveness of the model for upper-elementary and middle school, secondary education, community colleges, and various levels of English language learning will foster the ability to have varieties of prepared deliverable modules that address specific population needs. My particular hope is to be able to present this model of identification and instruction of high-frequency interdisciplinary vocabulary in settings where there is a need for instructional improvement to help students become more college and career ready, and where resources may be lacking to aid this improvement. As the primary materials needed for implementation of the model would be readily available to most educators, it could be fairly easily incorporated into instruction in almost any setting in which it would be potentially beneficial.

Conclusion

This dissertation has indicated the potential benefits of a corpus-based model of direct vocabulary instruction focusing on high-frequency interdisciplinary terms that are selected from authentic student texts in university reading support courses. While there are legitimate challenges and limitations to such an endeavor, as Gardner and Davies (2014) pointed out, there is a need to provide some type of instruction for struggling readers that is aimed at boosting their lexical acquisition of high-frequency terms. From a pragmatic viewpoint, practitioners need to identify decisive approaches to instruction that take into account the needs of their students and the best possibilities that pedagogical research and current technology have to offer. The present study has addressed this need.

The model presented has been constructed with detailed research-based methodologies that are practical to use in classroom settings. As is the case with any multifaceted model for instruction, there are many variables that could be studied in greater depth and points at which the model could potentially be improved for future use. My goal in conducting this study has been to create an approach that is useful for my own instruction and that can be shared with other educators and researchers for the ultimate benefit of students.

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APPENDICES

APPENDIX A

Posttest with Item Types

Directions: For each item, tell what the underlined word means in the context in which it is used. Give as much information as is helpful to demonstrate what you know. If you use a different form of the underlined word in your description, explain what that word means.

Test Phase 1

1. The adults showed higher tolerance than the children for pain and stress.

Transfer

2. Members of the tribe were afraid to share their knowledge because they feared it would be exploited by the government and used against them.

Instructional context

3. Scientists had already provided the first estimate of the rate of spontaneous mutation of a human gene.

Transfer

4. The chairman of the budget committee was a well-known advocate of science funding.

Instructional context

5. The silence in the courtroom was broken by spontaneous applause.

Instructional context

6. Finally, preceded by a mile of parade, came the princess' float.

Transfer

7. The policy would stop trade with companies that rely on the labor of exploited children.

Transfer

8. Participation in the program encouraged tolerance toward foreigners.

Instructional context

9. The District of Columbia set an example for the nation by integrating all of its facilities, including public schools.

Instructional context

10. By shaping the development of technology, Bill Gates has changed the course of civilization.

Instructional context

11. The study looks at the extent to which students are actually embodying the principles taught in physical education classes.

Transfer

12. A dictatorship in that nation preceded the form of government that exists today.

Instructional context

13. It was suggested that men talk to their sons about unrealistic male body ideals held by society.

Transfer

14. Regular exercise can help moderate mood swings.

Transfer

15. We need to advocate for workplaces that offer flex time and daycare options.

Transfer

16. The committee's report included language embodying the senator's proposals.

Instructional context

17. The president vetoed the bill because he felt it did not uphold our national ideals.

Instructional context

18. The goal of these Indian schools was the civilization of the native people.

Transfer

19. The school implemented the new plan, integrating music into all instructional areas.

Transfer

20. Even moderate Democrats raised concerns about the proposed budget.

Instructional context

Test Phase 2

1. We come to this discussion from two different languages, and hence, from two perspectives.

Instructional context

2. The Virginia Company of London was founded by the king and, accordingly, was founded for religious as well as economic purposes.

Instructional context

3. A benefit of the software is that it can compensate for flaws in older operating systems.

Transfer

4. The papers claimed that immigrants faced induction into the armed forces during the war.

Instructional context

5. The newly elected candidates were not welcomed by the party's hierarchy.

Instructional context

6. With further experimentation, we may be able to tell whether the treatment is effective for other groups.

Transfer

7. Learning techniques of photo-developing heightened the artistry of his work.

Transfer

8. The issue is not a large concern now, and will be much smaller a few decades hence.

Transfer

9. The scientific method offers an impersonal approach to evaluating the validity of new claims.

Transfer

10. Human personality traits can be organized into a hierarchy of three levels.

Transfer

11. The results justify further exploration into this issue.

Instructional context

12. The journal welcomes the submission of articles related to the topic of space exploration.

Transfer

13. The speaker attempted to define his past drug use as an aspect of youthful experimentation.

Instructional context

14. Her systematic arguments applied *induction* and logic to information that was known.

Transfer

15. This may be a reason that people feel the need to justify themselves after a conflict.

Transfer

16. Parents can use charts that suggest maximum daily caffeine consumption, and should limit children's intake accordingly.

Transfer

17. One effect of frequent testing is a more impersonal school climate.

Instructional context

18. The government was asked to compensate Native Americans for resources and lands taken from them.

Instructional context

19. The campaign led to a heightened awareness of environmental concerns.

Instructional context

20. The dictator's actions failed to bring the minority groups into submission.

Instructional context

APPENDIX B

M. Davies Permission of Use Letter

Please let this email server as permission to use these images.

Best,

Mark D.

=====
Mark **Davies**
Professor of Linguistics / Brigham Young University
<http://davies-linguistics.byu.edu/>
** Corpus design and use // Linguistic databases **
** Historical linguistics // Language variation **
** English, Spanish, and Portuguese **
=====

APPENDIX C

Pearson Permission to Reprint Letter



Permissions
 4th Floor, Auto Atlantic
 Corner, Hertzog Boulevard &
 Heerengracht
 Cape town, 8001
 South Africa
 USAPermissions@pearson.com

Apr 1, 2019

PE Ref # 208476

Timothy Nelson
 MIDDLE TENNESSEE STATE UNIVERSITY
 1301 E. Main St., Box 16
 Murfreesboro, TN 37132

Dear Timothy Nelson,

You have our permission to include content from our text, ***WORDS THEIR WAY WITH STRUGGLING READERS: WORD STUDY FOR READING, VOCABULARY, AND SPELLING INSTRUCTION, GRADES 4 - 12, 1st Ed. by FLANIGAN, KEVIN; HAYES, LATISHA; TEMPLETON, SHANE; BEAR, DONALD R.; INVERNIZZI, MARCIA; JOHNSTON, FRANCINE***, in your dissertation or masters thesis at Middle Tennessee State University.

Content to be included is:
 244 First-to-Five rating scale figure

Please credit our material as follows:
FLANIGAN, KEVIN; HAYES, LATISHA; TEMPLETON, SHANE; BEAR, DONALD R.; INVERNIZZI, MARCIA; JOHNSTON, FRANCINE, WORDS THEIR WAY WITH STRUGGLING READERS: WORD STUDY FOR READING, VOCABULARY, AND SPELLING INSTRUCTION, GRADES 4 - 12, 1st, ©2011. Reprinted by permission of Pearson Education, Inc., New York, New York.

Sincerely,
 Julia Alexander
 Global Rights/Permissions Analyst

APPENDIX D

Internal Review Board Approval Letter

IRB
INSTITUTIONAL REVIEW BOARD
 Office of Research Compliance,
 010A Sam Ingram Building,
 2269 Middle Tennessee Blvd
 Murfreesboro, TN 37129



IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Monday, April 16, 2018

Principal Investigator Timothy S. Nelson (Student)
 Faculty Advisor Mohammed Albakry
 Co-Investigators Cyrlle Magne
 Investigator Email(s) Timothy.Nelson@mtsu.edu; Mohammed.Albakry@mtsu.edu
 Department English

Protocol Title Building a Corpus-Based Instructional Model: Identifying and Teaching Interdisciplinary Academic Vocabulary in University Reading Support Courses
 Protocol ID 18-2215

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXPEDITED** mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category (7) Research on individual or group characteristics or behavior. A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	APPROVED for one year from the date of this notification
Date of expiration	4/30/2019
Participant Size	30 (thirty)
Participant Pool	MTSU Students in READ 1000
Exceptions	NONE
Restrictions	1. Participants must be age 18+ 2. Informed consent must be obtained 3. Identifying information will be destroyed upon data processing
Comments	NONE

This protocol can be continued for up to THREE years (4/30/2021) by obtaining a continuation approval prior to 4/30/2019. Refer to the following schedule to plan your annual project reports and be aware that you may not receive a separate reminder to complete your continuing reviews. Failure in obtaining an approval for continuation will automatically result in cancellation of this protocol. Moreover, the completion of this study MUST be notified to the Office of Compliance by filing a final report in order to close-out the protocol.

IRBN001

Version 1.3

Revision Date 03.06.2016

Institutional Review Board Office of Compliance Middle Tennessee State University

Continuing Review Schedule:		
Reporting Period	Requisition Deadline	IRB Comments
First year report	4/30/2019	TO BE COMPLETED
Second year report	4/30/2020	TO BE COMPLETED
Final report	4/30/2021	TO BE COMPLETED

Post-approval Protocol Amendments:		
Date	Amendment(s)	IRB Comments
NONE	NONE	NONE

The investigator(s) indicated in this notification should read and abide by all of the post-approval conditions imposed with this approval. Refer to the post-approval guidelines posted in the MTSU IRB's website. Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 484-8918 within 48 hours of the incident. Amendments to this protocol must be approved by the IRB. Inclusion of new researchers must also be approved by the Office of Compliance before they begin to work on the project.

All of the research-related records, which include signed consent forms, investigator information and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
 Middle Tennessee State University

Quick Links:
[Click here](#) for a detailed list of the post-approval responsibilities.
 More information on expedited procedures can be found [here](#).

IRBN001 - Expedited Protocol Approval Notice

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