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The Effects of Teacher Coaching in the LINCing Routine on the Vocabulary Knowledge of Secondary Students with Disabilities

Dana W. Cho
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The Effects of Teacher Coaching in the LINCing Routine on the Vocabulary Knowledge of Secondary Students with Disabilities

by

Dana W. Cho

A Dissertation
Submitted to the Faculty of Old Dominion University
In Partial Fulfillment of the Requirements
For the Degree of
Doctor of Philosophy
Special Education Concentration

Old Dominion University
August 2018

Approved by:
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The Effects of Teacher Coaching in the LINCing Routine on the Vocabulary Knowledge of Secondary Students with Disabilities

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Dedication

This dissertation is dedicated to all of my current and former students and teachers who have endured my long educational journey and embraced this learning with me. I have learned and grown exponentially and continue to ignite the fires of learning within me. I hope I can spark the same light within you to grow and experience your journey of learning.
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Abstract

The Effects of Teacher Coaching in the LINCing Routine on the Vocabulary Knowledge of Secondary Students with Disabilities

Dana W. Cho

Old Dominion University, 2018

Dissertation Chair: Dr. Silvana Watson

A pretest-posttest time series design controlling for teacher coaching was used to evaluate the effects of the LINCing Routine to support secondary students with disabilities while increasing students’ vocabulary knowledge. Two special education teachers and 26 secondary students with disabilities participated in this study. Student performance was investigated in terms of increased accurate use of the LINCing Routine and overall improvement of vocabulary knowledge while controlling for teacher coaching. The dependent variable increased and remained stable throughout intervention. Pretest and posttest results were also favorable. Students reported average social validity while teachers reported high social validity for the intervention. The results suggested that secondary students with disabilities can be trained to use the routine to support their understanding of vocabulary words and increase their academic vocabulary knowledge.
CHAPTER ONE

INTRODUCTION

Reading comprehension becomes a challenge as students transition from one grade level to the next; the gathering of meaning from printed words becomes more critical as students progress through school. In light of meeting adequate-yearly-progress (AYP) goals in reading, and the fact that reading is often a skill area for referral to special education (Boulineau, Fore, Hagan-Burke, & Burke, 2004), secondary level teachers are presented with new obstacles each year. When students with disabilities are taught in general education settings and need to earn credits towards graduation, teachers are increasingly responsible of teaching comprehension and vocabulary. Several researchers have asserted that students with reading deficits can be supported through the use of mnemonic strategy-based vocabulary instruction (Barton-Arwood, & Little, 2013; Bryant, Goodwin, Bryant & Higgins, 2003; Jitendra, Edwards, Sacks, & Jacobson, 2004; Keel, Slaton, & Blackhurst, 2001; Roberts, Torgesen, Boardman, & Scammacca, 2008; Watson, Gable, Gear, & Hughes, 2012). However, there are gaps in the current literature supporting the use of mnemonic strategy-based vocabulary instruction. This study addressed the paucity of research in this area. This investigation examined the effectiveness of the LINCing routine, a mnemonic content-enhancement routine to teach vocabulary, paired with teacher coaching to improve the vocabulary knowledge of secondary students with disabilities. This chapter provides an overview of the problem, along with gaps in the current literature, a rationale for the study as well as the statement of the problem. Two research questions are provided.
**Problem Context**

**Student performance in reading.** The National Reading Panel Report (2000) identified five areas essential to effective reading instruction: (1) phonemic awareness, (2) phonics, (3) fluency, (4) vocabulary, and (5) comprehension. Vocabulary knowledge has been shown to influence reading fluency and comprehension (Seifer & Espin, 2012). Vocabulary acquisition has been linked to working memory skills (Cain, Oakhill, & Lemmon, 2004). Because students with disabilities have deficits in working memory capacity and other executive cognitive processes, teachers should embed intentional instruction to include repetition and multiple exposures of content, incorporate active and engaging lessons, use of mnemonic memory strategy, and use of computer technology in the classroom (Stetter & Hughes, 2010). In order for a student to grasp understanding, it is necessary to hold a mental model of the word in working memory while reading about it, make new connections, and revise understanding of the subject matter. Without these additional supports, students with disabilities often struggle to benefit from reading instruction that does not consider increasing their vocabulary skills for comprehension of grade-level materials (Boulineau et al., 2004; Faggella-Luby, Schumaker, & Deshler, 2007; Guthrie & Humick, 2004; Stetter & Hughes, 2010; Watson et al., 2012).

Moreover, one of the challenges facing teachers is the increase of the wide range of academic needs in the diverse population of students they encounter. These teachers are encouraged to differentiate instruction to include direct and explicit comprehension instruction for students with disabilities and other low-achieving students while simultaneously challenging high-achieving students in the same classroom. It is also important to recognize that motivating struggling students to read becomes increasingly difficult as they age. (Boulineau et al., 2004; Faggella-Luby et al., 2007; Guthrie & Humick, 2004; Stetter & Hughes, 2010).
Teachers feel they do not have sufficient training or enough time to be proficient in utilizing research-based intervention in the classroom (Stormont, Reinke, Newcomer, Marchese, & Lewis, 2015). Implementation of the intervention is affected by teachers’ lack of fidelity, coaching support, professional development, and feedback (Bethune & Wood, 2013). Research on teacher interactions consistently demonstrates improvements in student learning when teachers deliver clear objectives, increase their rate of questioning, and provide increased opportunities for students to respond (Baggerman, Ault, Collins, Spriggs, & Slocum, 2015).

By the same token, reading is one of the main avenues for students to gain vocabulary. However, as students with disabilities have difficulty with reading skills, they possess limited academic vocabulary and fail to engage in independent reading to improve vocabulary development (Barton-Arwood, & Little, 2013; Bryant et al., 2003; Jitendra et al., 2004; Keel et al., 2001; Roberts, Torgesen et al., 2008; Watson et al., 2012). For students with disabilities, strategies for contextual word learning are less effective. As a result, students with disabilities have a fragmented and less complete knowledge of words and understanding of word features (Bryant et al., 2003; Jitendra et al., 2004).

**Rationale for this Study**

The study investigated a mnemonic and content enhancement strategy intervention controlling for teacher coaching for secondary students with disabilities. It was important and timely because advanced research in vocabulary instruction, and investigated the effectiveness of the LINCing Routine as a form of mnemonic and content enhancement strategy in improving the academic vocabulary knowledge of secondary students with disabilities. Findings may assist practitioners to better address the vocabulary challenges of secondary students with disabilities.
This research will extend previous studies in the field of reading, specifically in vocabulary instruction for secondary students with disabilities.

**Statement of Purpose**

The purpose of this research was to extend previous research that suggested that mnemonic and content enhancement strategies combined with teacher coaching can be effective in teaching academic vocabulary to secondary students with disabilities. The strategy used in the current study was the LINCing Routine as a form of mnemonic and content enhancement strategy for vocabulary instruction. It was hypothesized that the LINCing Routine would increase students’ vocabulary knowledge, and while they were learning new words, students’ awareness of cognitive strategies would increase through activation of prior knowledge, visualization, and recall, all of which are explicitly taught using the LINCing Routine. As previous research had limited focus on secondary level students, the proposed study investigated the effectiveness of the LINCing Routine on the academic vocabulary knowledge of high school students with disabilities.

Consequently, this study had two hypotheses:

1. Explicit instruction of the LINCing Routine will increase vocabulary knowledge of secondary students with disabilities in special education classrooms.

2. The impact of teacher coaching and explicit instruction of the LINCing Routine will increase vocabulary knowledge of secondary students with disabilities in special education classrooms.

**Research Questions**

The study addressed two research questions:
1. Will teacher coaching in the use of the LINCing Routine improve the vocabulary knowledge of secondary students with disabilities in special education classrooms as measured by a significant difference between pretest-posttest performances on selected assessments?

2. Will improvement in the vocabulary knowledge of secondary students with disabilities as measured by pretest-posttest change scores be related to the frequency of teachers’ use of explicit instruction of the LINCing Routine during classroom activities?

Summary

This dissertation is organized into five chapters. Chapter one provided an overview of the problem, the gaps in research, and research questions. Chapter Two presents a review of literature related to mnemonic, content enhancement, technology based vocabulary instruction and teacher coaching for students with disability in the secondary level. Chapter Three describes the research design and methodology of the study, including the participants, instruments used to gather data, and the procedures followed are also described. An analysis of the data and a discussion of the findings are presented in Chapter Four. Chapter Five includes a summary of the results, conclusions, recommendations, and implications of the study. Finally, a list of references and appendices of materials used in the implementation of the study are provided.
CHAPTER 2

REVIEW OF THE LITERATURE

The goal of vocabulary instruction is to facilitate students’ ability to interact with language situations (Bryant et al., 2003; Jitendra et al., 2004). While vocabulary acquisition is positively affected by providing numerous reading opportunities, it is negatively affected by memory and language deficiencies which are typical difficulties manifested by students receiving specially designed instruction (Barton-Arwood, & Little, 2013; Bryant et al., 2003; Jitendra et al., 2004; Keel et al., 2001; Roberts et al., 2008; Watson et al., 2012). Also, given that students with disabilities may have inadequate vocabulary knowledge and difficulties with learning, it is critical to examine what research says about vocabulary instruction and teacher coaching for students with disabilities.

There are two types of vocabulary, oral and written. Oral vocabulary denotes words that a reader recognizes in listening and uses in speaking. Reading vocabulary refers to words that a reader recognizes and uses in print. If words are in the reader’s oral vocabulary, the reader can understand the meaning and decode the word (Vaughn & Bos, 2009). Students who do not possess basic reading skills by the end of the third grade will likely continue to struggle. For struggling, secondary-level students, the performance gap may continue to widen as the expectations for proficiency skills rises. Older students identified with learning disability (LD) generally avoid reading as an independent activity which limits their exposure to new vocabulary (Bryant, 2003; Roberts, et al., 2008; Vaughn & Bos, 2009).

As these students choose not to read independently, they struggle to access content information, their performance rate decreases compared to their peers, and they continue to fall further behind. Struggling readers and students with LD often lack motivation and engagement,
which limits their opportunities to build vocabulary and develop effective strategies (Bryant, 2003; Roberts, et al., 2008; Vaughn & Bos, 2009). Bryant et al. (2003) conducted a review of literature on vocabulary instruction for students with LD. They categorized the vocabulary interventions into four areas: mnemonic strategy instruction, concept enhancement instruction, fluency-building vocabulary practice activities, and computer-assisted instruction. Additionally, Jitendra et al. (2004) extended this review of research with the same four categories of vocabulary intervention and included an additional category, the use of constant time delay.

Most of the studies reviewed by Bryant et al. (2003) and Jitendra et al. (2004) were conducted in the late 1980s and 1990s. With increasing reading requirements at the secondary level and with more technical vocabulary that is difficult to comprehend, studies focusing on effective vocabulary instruction seem paramount (Barton-Arwood, & Little, 2013; Bryant et al., 2003; Jitendra et al., 2004; Keel et al., 2001; Roberts et al., 2008; Watson et al., 2012).

The literature reviewed for this study is organized into three areas of vocabulary instruction to include mnemonic strategy, content enhancement, and technology-based. This is an extension of the review of literature conducted by Bryant et al. (2003) and Jitendra et al. (2004). Each study was reviewed independently and examined according to study characteristics (e.g., study design, intervention integrity).

**Mnemonic Strategy Instruction**

The mnemonic strategy involves associative memory facilitation that assist with recall and retention of information. Keyword and illustration links are two components of mnemonic strategy. The keyword provides a similar sounding word to be associated with the unknown word. The illustration provides a picture of the definition of the unknown word. These two components serve to facilitate memorization and recall of the target vocabulary word (Barton-
Arwood, & Little, 2013; Fontana, Scruggs, & Mastropieri, 2007; Scruggs, Mastropieri, Berkeley, & Marshak, 2010). Three studies were found that implemented some form of mnemonic strategy to assist students in learning vocabulary.

The research of Terrill, Scruggs, and Mastropieri (2004) used a repeated-measure design to examine the keyword method to increase the vocabulary knowledge of tenth grade high school students in a self-contained special education class. The keyword provides a similar sounding word to be associated with the unknown word. Results indicated students in the nonmnemonic condition correctly recalled a mean of only 14.6 out of 30 vocabulary words. In contrast, students’ recall was much greater in the mnemonic condition (mean of 27.5 out of 30 vocabulary words recalled correctly) which yielded statistically significant differences, \( t(7) = 7.74, p < .001 \).

Fontana et al., (2007) concurred with Terrill et al. (2004). Fontana and colleagues (2007) examined whether mnemonic strategy instruction would facilitate learning in inclusive high school social studies classes as compared to direct instruction. Their study included 13 students identified as having LD out of fifty-nine students from four inclusive classrooms. This study was conducted in inclusion classrooms instead of in a self-contained classroom which was the setting in the investigation of Terrill et al. (2004). Also, the study of Fontana et al. (2007) only included eight students. They found that students performed higher when in the mnemonic condition than in the direct instruction condition. Additionally, the correlation between performance and strategy use across conditions was statistically significant for Unit 1, \( r = .344, p = .001 \) and approached significant for Unit 2, \( r = .238, p = .089 \).

Furthermore, Harris, Schumaker, and Deshler (2011) investigated the effects of teaching high school students with and without disabilities a morphemic analysis strategy (word mapping) for analyzing and predicting the meaning of words against a mnemonic strategy (LINCS) by
using a pretest-posttest comparison-group design to determine students’ strategy use and vocabulary knowledge. This research extended the research of both Terrill et al., (2004) and Fontana et al., (2007) by comparing the effectiveness of using two types of mnemonic strategies on students with and without disabilities. In comparison to the two previous studies, the study of Harris et al. (2011) encompassed 230 students with and without disabilities enrolled in ninth grade English classes. Ten students with learning disabilities were in the word mapping group (WM), six were in the LINCS group (LS), and eight were in the Test-Only group. Results indicated significant gains from pretest to posttests for the strategy-use test (mean ES = .925), word knowledge test (mean ES = .780), and morphological analysis test (mean ES = .387). All reflected medium to large effect sizes. Also, both groups (i.e., students with and without disabilities) made more significant gains. However, students in the word mapping condition had larger effect size gains than the vocabulary LINCing condition.

The results from all three studies yielded significant effects on the use of mnemonic strategies in improving vocabulary for students with LD. The studies were conducted in inclusive settings in social studies and English, in the general education setting, as well as in a self-contained social studies classroom. However, the participants with LD in the studies were limited in numbers. Additionally, the intervention period ranged from seven class periods to six weeks. The limited number of students with LD and the variations in intervention periods could affect generalizability of results.

**Content Enhancement Instruction**

Content enhancement strives to activate student background knowledge, developing conceptual understanding, and building semantic relationships among word meaning. This is usually accomplished through semantic mapping, semantic features analysis, semantic/syntactic
feature analysis, and graphic organizers (Barton-Arwood, & Little, 2013; Bryant et al., 2003; Jitendra et al., 2004; Keel et al., 2001). Four studies were found that implemented the use of content enhancement to assist students with LD to acquire vocabulary knowledge.

Two studies were identified that examined the use of content enhancement to improve content-area vocabulary. Fore, Boon, and Lowrie (2007) compared the effectiveness of definition and concept model on the learning of content-area vocabulary words of six middle school students with LD in a self-contained classroom. Fore et al. (2007) used a multiple baseline across participants design. On the other hand, Shook, Hazelkorn, and Lozano (2011) examined the use of Collaborative Strategic Reading (CRS) in an inclusive ninth grade biology class to improve students’ scientific vocabulary knowledge. Both studies examined the use of content enhancements to improve vocabulary acquisition for students with LD. Results indicated an increase in scores for all six students from baseline to intervention. Scores on the pretest ranged from 0% correct to 8.89% correct, whereas posttest scores ranged from 57.58% to 82.22% correct. The research of Shook et al., (2011) used Wilk’s Lambda, a statistical measure to quantify the effect size, to analyze the data. The results showed significant difference in quiz scores for both groups of students (ES = 0.83).

Moreover, Seifert and Espin (2012) extended the two previous research studies to examine the effects of three types of reading intervention (text reading, vocabulary learning, and text reading plus vocabulary learning) on the science text reading of secondary students with LD. Results revealed significant treatment effect in text-reading and the combined condition (ES = 0.97). Vocabulary knowledge was measured by counting the number of correct matches students made on the vocabulary measure. A repeated-measure ANOVA revealed a significant treatment effect in the combined condition (ES = 0.76). All three studies focused on scientific vocabulary
knowledge and concurred with findings from the review of research conducted by Bryant et al. (2003) and Jitendra et al. (2004).

Dexter and Hughes (2011) conducted a meta-analysis on the use of graphic organizers and their effectiveness for students with LD. They examined 16 research articles involving students with LD ranging from grade 4 to grade 12 using graphic organizers to learn vocabulary in core-content classes. The majority of the studies incorporated aspects of direct, explicit instruction with modeling and prompted practice. Results yielded 55 unique posttest effect sizes from the sixteen articles. Findings from the meta-analysis indicated that graphic organizers improved factual comprehension. Also, the analysis indicated that graphic organizers may improve vocabulary and inference comprehension for students with LD. There was a large mean effect for posttest performance (ES = .91) and moderate mean effect for maintenance (ES = .56). These studies further supported the findings that the use of content enhancement strives to activate student background knowledge, developing conceptual understanding, and building semantic relationships among word meaning (Barton-Arwood, & Little, 2013; Bryant et al., 2003; Jitendra et al., 2004; Keel et al., 2001).

**Technology-Based Instruction**

Technology-based instruction is being used increasingly in classrooms to supplement teacher instruction, provide students with alternate ways to learn new materials, and to reinforce students’ basic skills focusing on drill and practice (Bryant et al., 2003; Jitendra et al., 2004; Johnston et al., 2000; National Reading Panel, 2000). Five studies were found that incorporated technology to assist students to increase vocabulary knowledge in the classroom. Technology in these studies included online software, web-based programs, applications, and delivery platforms.
Clay, Zorfass, Brann, Kotula, and Smolkowski (2009) examined the effects of online vocabulary support tools, Visual Thesaurus (VT) and Merriam-Webster Online (MWO), on vocabulary and comprehension for students in inclusive social studies classrooms at the middle school level. More recently, Grillo and Dieker (2013) examined how diagnostic-prescriptive instruction in biology vocabulary affected pretest, posttest, and delayed posttest scores of students with LD using paper versus digital flashcards. The results indicated that most students made gains in their knowledge of content from pretest to posttest which supported the use of flashcards to improve vocabulary knowledge. Additionally, students who used MWO made statistically significant gains on the vocabulary posttest (ES = .61) and content gains for MWO (ES = .57) and VT (ES = .34).

In contrast, Wood, Mustian, and Cooke (2012), Retter, Anderson, and Kieran (2013), and Kennedy, Thomas, Meyer, Alves, and Lloyd (2014) investigated the effectiveness of the delivery platform of vocabulary instruction by utilizing a computer-assisted peer tutoring program, the use of iPad 2 in conjunction with Second Chance Reading Program and Content Acquisition Podcasts (CAP). The results of Wood et al. (2012) indicated a functional relationship between morphograph instruction and the acquisition and generalization of vocabulary. Across students, the mean was 82.9% in the morphograph condition compared to 65.4% in the whole-word condition. In comparison, Retter et al. (2013) found minimal gains in the total number of vocabulary words learned. However, there was a significant gain in reading comprehension and higher student engagement and reduction in student negative behaviors (i.e., off-task, noise level, and inappropriate behaviors) was noted.

Kennedy et al. (2014) found students with disabilities taught using CAP had significantly higher than average curriculum-based measure scores on probes 1 to 4 (M = 7.6, SD = 1.1) than
students without the CAP instruction (M = 5.4, SD = 1.3). Results revealed that students with and without disabilities made significant growth on curriculum-based measurement probes and scored higher on the posttests when taught using CAP. The authors noted that when instructed with CAP built on valid instructional design principles, and evidence-based instructional methods, students with LD learned vocabulary terms and concepts at a faster rate.

The studies reviewed in the last 20 years suggest that vocabulary instruction for students with LD can lead to gain in word knowledge. The effect sizes calculated for seven of the thirteen investigations indicated medium to large effect sizes for vocabulary instruction in mnemonic strategy, content enhancement, and incorporating technology to vocabulary instruction (Clay et al., 2009; Dexter, & Hughes, 2011; Fontana et al., 2007; Harris et al., 2011; Seifert, & Espin, 2012; Shook et al., 2011; Terrill et al., 2004). The interventions included in this review involved some types of manipulation, whether it was incorporating technology, interacting with text, and creating associative relationships using picture, grids and maps. Across studies, students demonstrated gains within a relatively short instructional time of the investigations. The outcomes on posttest scores were associated with large effect sizes. Instruction paired with mnemonic strategies also optimized learning for students. For studies that included a transfer measure, generalization effects were greater for instruction that involved deeper processing of word knowledge (e.g., mnemonic, content enhancement instruction). However, the participants in the studies with LD were limited in numbers. Additionally, the intervention period ranged from four to twelve weeks. These limitations could affect generalizability of results.

The findings from this review on vocabulary instruction indicate several implications and limitations. The most obvious is that researchers and practitioners must focus on methods that directly teach vocabulary. This review suggests that there are effective and efficient research-
based methods for vocabulary learning. However, different approaches to vocabulary learning depend on different instructional goals (Bryant et al., 2003; Jitendra et al., 2004; Roberts et al., 2008). For instance, if the purpose of instruction is to learn content-area vocabulary in a specific subject area, a content enhancement instructional approach might be more appropriate than direct definition instruction.

In addition, technology-based instruction seems to serve as a potentially valuable aid to improve vocabulary knowledge. There are several platforms and software programs that are available in the market. However, access to computers, cost of software programs, teacher knowledge, and time involved to instruct the lesson are variables that may impact the potential effectiveness of technology-based instruction.

When considering the difficulty students with LD have with acquiring words, investigations on the effects of vocabulary instruction seems paramount. This review only yielded 12 investigations to support vocabulary instruction for this population over the last 20 years, indicating a pressing need for further research in this area of instruction.

**Coaching Teacher Behavior**

Research indicates that supports in the form of coaching can result in increased implementation of newly learned practices that lead to positive changes in pupil performances (Joyce & Showers, 1982; Showers, Joyce, & Bennett, 1987; Kretlow & Bartholowew, 2010) and higher student achievement (Showers, 1984). More recently, Cornett and Knight (2009) reviewed research on cognitive coaching, peer coaching, instructional coaching, and literacy coaching. They found that much of the research across the various coaching models has been an exploratory process and lacks the rigor of true development. The majority of studies focused on academic instructional practices (Stormont, Reinke, Newcomer, Marchese, & Lewis, 2015).
In a review of literature, Kretlow and Bartholomew (2010) utilized strict criteria and included 13 studies. Of those studies, only one focused on coaching intervention targeting social behavior. Solomon, Klein, and Politylo (2012) also reviewed studies on coaching using only single subject research. Solomon and colleagues (2012), evaluated a form of coaching that utilized performance feedback where teachers were observed in their classroom and then provided feedback on targeted behaviors. Kretlow and Bartholomew (2010) maintain that modeling of discrete evidence-based practices, along with the opportunity for a teacher to emulate the modeled behavior and obtain performance feedback are essential components of the coaching process. Positive findings were documented for this form of coaching.

Bradshaw et al. (2018) examined the impact of Double Check coaching over and above the five-part professional development series and school-wide positive behavioral interventions and support activities. Using a teacher-level randomized controlled trial (experimental) design in 12 elementary and middle schools. They found evidence of significant added value associated with the Double Check coaching on the primary behavioral outcomes of interest, and observed teacher practices and student behaviors. Additionally, the effects of the Double Check coaching, using the adapted version of the classroom check-up (CCU), as adding value over the school wide professional development and PBIS activities, both in terms of teacher practices and observed student behaviors were significantly lower among those who received coaching.

In another study, Hemmeter, Hardy, Schnitz, Adams, and Kinder (2015) examined the effects of a professional development intervention on teachers’ implementation of practices related to the Pyramid Model for Promoting Social-Emotional Competence in Young Children, as well as the extent to which teachers generalized and maintained those practices. The Pyramid Model is a comprehensive, tiered model for promoting young children’s social-emotional
development and addressing challenging behaviors. A multiple probe design across sets of Pyramid Model practices replicated across three teachers was used in this study. All teachers acquired the practices and maintained the practices after coaching ended. There was some evidence of generalization for all three teachers. However, the results relate to generalization were mixed; only one of the three teachers demonstrated strong generalization. Teachers did not consistently use targeted practices in untrained activities. This indicates that when coaching teachers, it might be necessary to program for generalization by coaching them during different times of the day and in different activities. Explicitly coaching teachers on how to use the practices in a variety of activities might be necessary. Although it was not possible to establish a functional relation in regard to the teachers’ generalization and maintenance of practices (due to the design of the study), there were promising results for both. All teachers maintained their practices with only periodic reminders to use the practices. The effects of teacher implementation on classroom-wide incidences of challenging behavior were mixed. All teachers rated the coaching positively.

Moreover, Mason, Schnitz, Willis, and Rosenbloom (2017), using a multiple baseline design across five teachers investigated the impact of online instructional modules and a Practice-Based Coaching (PBC) model with teacher-as-coach on their paraprofessionals’ fidelity of discrete trial training (DTT). Implementation of the instructional modules yielded little to no change in paraprofessionals’ DTT fidelity. However, a clear functional relation between PBC and improvement in paraprofessionals’ fidelity of implementation of DTT was demonstrated. Like other focused intervention practices, implementation of DTT requires the delivery agent to follow very precise, clearly defined steps. DTT involves repeated delivery of trials which begin with presentation of instructions by the implementer. Following the student response,
consequences, either reinforcement or error correction, are implemented and then the next trial begins. Teachers were trained individually in PBC. One of the authors delivered the training utilizing a script and PBC fidelity protocol designed by the researcher. The trainer used PowerPoint slides to guide the in-person PBC teacher-as-coach training that lasted an average of 49 min (R = 35–58) across teachers. The teachers were trained to use an adaptation of PBC to coach their paras that included: collaborative goal setting, focused observations, and data-based feedback. The adapted PBC framework was presented and in-depth discussions with videos were used to train the teachers on each PBC component. Teachers practiced implementing PBC for DTT and the trainer provided feedback. This study added to a previous study indicating teachers can effectively utilize a coaching model to increase paras’ fidelity of implementation. The study of Mason et al. (2017) provided some preliminary evidence that more frequent goal-directed coaching sessions, such as conducted with a PBC model, may lead to a faster rate of acquisition of targeted skills than was achieved in their previous study which included a one-time only coaching session.

Furthermore, Jang and Sung (2009) examined peer coaching. Joyce and Showers (1982) introduced peer coaching as a component of in-service teacher training. A fully elaborated in-service peer coaching model with a planning and implementation focus consists of four elements: (1) the study of the theoretical basis or rationale of the teaching method, (2) the observation of demonstrations by persons who are experts in the teaching method, (3) practice and feedback in relatively protected conditions, and (4) coaching one another to assist the new method to be incorporated into day-by-day teaching style. Jang & Sung (2009) further developed a peer coaching-based model by revising Lumpe's (2007) model which can be applied to peer collaboration strategies and evaluation of students' results. In summary, the peer coaching-based
model includes the process of Pedagogy Content Knowledge (PCK) development and the content of PCK development. The study found moderate success and suggested peer coaching can increase reflective practice, aid implementation of teaching models and instructional strategies, and enhance classroom management and development of PCK ((Jang & Sung, 2009).

Thus, performance feedback appears to be a vital component for increasing teacher implementation of new skills in their classroom. Also, coaching models have included many elements such as direct observation of teachers, provision of feedback, and instruction on certain skills. However, little is empirically known about the most effective way to coach teachers, the training needs and skill level of coaches, and how coaching is delivered specifically to improve vocabulary knowledge of secondary students with disabilities (Stormont et al., 2015; Sailor & Price, 2015).

**Empirical Gaps in the Literature**

This review of the literature revealed that there are gaps in the available research on vocabulary instruction for adolescents with disabilities that need to be examined. First, many existing studies have been conducted by similar or overlapping research teams. There is a need for other researchers to investigate mnemonic and content enhancement strategies in vocabulary instruction in order for it to be considered an accepted evidence-based practice in schools. In addition, the participants for students with disabilities were limited in numbers. Also, there is a need to investigate the effectiveness of the mnemonic and content enhancement strategies on students with disabilities and students who have reading difficulty. Finally, the reviewed studies’ intervention period ranged from four to twelve weeks. The limited number of students with disabilities and the variations in intervention periods could affect generalizability of results.
CHAPTER 3

METHODOLOGY

Experimental Design

This study was designed to examine the effectiveness of coaching on special education teachers’ use of the LINCing Routine to teach vocabulary to secondary students with disabilities. A pretest-posttest time series design that controlled for teacher coaching was used with random assignment of three intact special education had two conditions, an experimental and control. In the experimental condition, one teacher was provided performance feedback on a weekly basis using the performance feedback checklist. No performance feedback was provided to the teacher in the control condition. Both teachers learned how to instruct students in the vocabulary LINCing Routine.

The independent variable for each research question was explicit instruction of LINCing Routine and teacher coaching. The dependent variable in question one was the improvement of vocabulary knowledge as measured by difference between pretest-posttest performances. The dependent variable in question two was the improvement of vocabulary knowledge as measured by difference between strategy-use test performances. Both dependent variables were measured through pre and posttests that consisted of 20 questions from a released state standardized test and Strategy-Use Tests.

Students in all classrooms were given a pretest and posttest consisting of 20 questions from a released state standardized test to measure their academic performance. The teachers instructed students using the LINCing Routine on five randomly selected words from the unit each week. Then, the teachers gave a formal assessment to students at the end of each week to measure progress for a period of 4-6 weeks. Additionally, one teacher was coached using the
teaching performance checklist on a weekly basis. Students were given instruction every other day for a period 4-6 weeks. Video recording on delivery of teacher instruction and teaching performance occurred once every week within the study period to ensure fidelity of the strategy implementation. Coaching feedback on the teachers’ instruction performance occurred every week within the study period to ensure fidelity of implementation.

Participants and Setting

Setting. Two special education teachers and 26 high school students in 9-12 grade attending two self-contained special education language arts classrooms and one self-contained special education science classroom were included in this quasi-experimental design study. Teacher participation was solicited from a high school in a southeastern Virginia school division. The two teachers who volunteered for the study and their 26 special education students attended the same high school. The school was chosen based on convenience for direct-observation data collection and for its cooperation among staff members. The student demographics, special education status, language proficiency, and economic status were considered to address issues of threats to external validity in making generalization about teachers. The high school has a total enrollment of more than 1900, and the overall level of achievement in the high school shows more than 70% of the students scoring above the 74th percentile on standardized tests and approximately 80% passing statewide tests at the proficient or advanced levels.

Letters were sent to students’ parents and a brief overview of the purpose of the research was included in the letter (see Appendix B). Parental consents and students’ assents were not needed due to the exempt research status for this study. Consent to conduct this research was also obtained from the school division prior to informing parents and students of the study.
Finally, permission was granted and informed consent forms were signed by the two teachers who participated in the investigation (see Appendix C).

**Students.** 26 high school students in 9-12 grade attending two self-contained special education language arts classrooms and one self-contained special education science classroom were included in this quasi-experimental design study. All students in the investigation were classified as receiving specially designed instruction in their area of need based on federal and state criteria. Twelve students were identified under the category of Specific Learning Disability, one student was identified under the category of Emotional Disability, six students were identified under the category of Other Health Impairment, one student was identified under the category of Intellectual Disability, and six students were identified under the category of Autism. The students ranged in age from 14 years to 19 years, with a mean age of 16 years and 5 months. The study took place in the students' own special education classrooms. Characteristics of the 26 participants are presented in Table 3.1.

**Teachers.** The two teachers had a combined 12 years of experience teaching students with disabilities. One teacher (T1) held a bachelor’s degree in special education from an accredited higher education facility and taught two self-contained language arts classes. One teacher (T2) held a master’s degree in special education and licensed to teach science content from an accredited higher education facility, and taught one self-contained science class. The study took place in the students' own special education classrooms. These are typical classrooms that accommodate 10 to 15 students in each class. To aid instruction, the teachers used a Promethean Board and white boards in the classroom. Demographic information was collected from school records for all participating students.
Table 3.1

Participants’ Demographic Data on Student with Disabilities (SWD)

<table>
<thead>
<tr>
<th>Category</th>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
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</tr>
<tr>
<td>Male</td>
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<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
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<td>4</td>
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</tr>
<tr>
<td>African American</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Hispanic</td>
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<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Multi-ethnic</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>American Indian</td>
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<td>0</td>
<td>0</td>
</tr>
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<td><strong>Disability Category</strong></td>
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<td>7</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>ED</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>OHI</td>
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<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ID</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AUT</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total Participants (N = 26)</strong></td>
<td><strong>9</strong></td>
<td><strong>11</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

Note. *SLD = Specific Learning Disability; ED = Emotional Disability; OHI = Other Health Impairment; ID = Intellectual Disability; AUT = Autism*

Materials

All classrooms. Students in all classes were given a pretest and posttest consisting of 20 questions from a released state standardized test to measure their academic performance (See Appendix D). The questions selected from the state test included those questions that measured students’ vocabulary knowledge. Four lessons were developed to ensure fidelity across participants (See Appendix E), and criterion probe checks (weekly assessments) were provided for students at end of each week (See Appendix F). The teachers instructed students utilizing the
LINCing Routine on five words randomly selected from each unit. On the first day of each lesson of the week, the teachers presented and reviewed examples of the LINCing Routine.

**Pretest.** Pretests were administered during two class periods (90 minutes each) prior to the learning of LINCing Routine in which all participants were given as much time as they needed to complete the test. The tests were administered in the following order: (a) A Released State Standardized Test, and (b) Strategy-Use Test (see Appendix G). The Strategy-Use Test, which is designed to determine whether students learned the strategy they were taught, was not given until the second week of this study.

**Posttest.** Posttests were administered at the end of the study during two class period (90 minutes each) in which all participants were given as much time as they needed to complete the tests. The tests were administered in the same order as the pretest.

**Teacher Training.** Teachers were solicited from a high school in a southeastern Virginia school division. After consenting to participate, both teachers were involved in a 2-hour training on how to use the LINCing Routine and only one teacher was trained on the teaching performance behavior checklist. Teacher training involved explanation, description, and modeling of the strategy by the trainer and provided role-play practice opportunities until the teachers demonstrate mastery of teaching the strategy. One teacher (T1) taught two self-contained language arts classrooms (Class A and Class B) and one teacher (T2) taught one self-contained science classroom (Class C). The T2 who taught the self-contained science classroom received coaching.

**LINCing Routine.** The Vocabulary LINCing Routine (Ellis, 2001) (See Appendix H), is a set of cognitive and behavioral steps that students can use to help memorize and recall the meaning of words. This process involves the use of a set of mnemonic strategies that include: (a)
a keyword strategy, (b) a visual imagery strategy, (c) a story strategy to link known words and information to new vocabulary words and their definitions, and (d) a self-testing method used while practicing recalling the meaning of the word. The mnemonic device LINCS helps students remember the steps. L of the LINCing Routine stands for listing the parts, I stands for identify a reminding word, N stands for noting a LINCing story, C stands for creating a LINCing picture, and S stands for self-test.

In the first step of the strategy, students write the word. Second, students write the definition. Third, students identify a reminding word that sounds or looks like the new word. Fourth, students create a LINCing Story, a statement or phrase that includes both the Reminding Word and the definition. Next, students draw a picture that includes the important parts of the LINCing story. Finally, they self-test using a procedure that helps them recall both the word and its meaning. During this self-test procedure, the students say the word to themselves, think of the Reminding Word, think of the LINCing Story, think of the picture, and then remember the definition. Alternatively, they do the self-test process in reverse by saying the definition to themselves and then thinking of the picture, the story, the Reminding Word, and then the original word. As students follow the LINCS Steps, they fill in a graphic device called the LINCS Table (Ellis, 2001) (See Appendix I).

In the top half of the far-left box of the LINCS Table is a space for students to write the vocabulary word to be learned. Directly below, there is a place for students to write a Reminding Word; that is, a word that sounds or looks like all or part of the new word. To the right of the above-mentioned boxes is a place for students to write a brief story. Directly to the right of this box is a place for the student to draw a picture of the story. Finally, in the box farthest to the left and below the vocabulary word is a space for writing the definition of the word. Students can
fold the device for use during the self-test process so that they can see only the word or the definition, depending on which self-test process they are using. In addition to the steps, while instructing the students, teacher made PowerPoint slides were projected on the Promethean Board as a visual reminder for students to include the example and the listing each step (See Appendix H). These PowerPoint slides contained the vocabulary words utilizing the LINCing Routine.

**Teacher Coaching.** Coaching involves an expert providing initial training to teachers on an instructional strategy accompanied with follow-up observation in which the expert provides feedback on the accuracy of implementation of the practice (Solomon et al., 2012). The follow-up component of coaching is referred to as performance feedback (Stormont et al., 2015; Sailor & Price, 2015). The performance feedback was conducted with one teacher (T2) once a week utilizing the performance feedback check list (See Appendix J).

**Procedure**

This study was designed to examine the effectiveness of teacher coaching in the use of the LINCing Routine on the vocabulary knowledge of secondary students with disabilities. A pretest-posttest time series design controlling for teacher coaching was used with random assignment of three intact special education classrooms. The following conditions were used: (a) teacher coaching (i.e., training plus performance feedback). Although both teachers were trained on the LINCing Routine, only one teacher (T2) was provided with performance feedback on a weekly basis on the performance feedback checklist, and (b) teaching of the LINCing Routine to students as a mnemonic strategy to study new vocabulary. Video recordings for direct observation of delivery of teacher instruction were used to check fidelity of strategy delivery and implementation.
Each Monday or Tuesday (the class met every other day due to block scheduling), the teachers provided students five vocabulary words and a lesson on the LINCing Routine. Guided practice and independent practice were conducted on the same class meeting and a review occurred on the next class period. The teachers tested their students every third day during the study period. Throughout the study, the class met for 90 minutes two or three times a week due to block scheduling.

On Monday or Tuesday, the teachers presented new vocabulary words one at a time, projected on the Promethean Board. The teachers pronounced each word and asked the students to repeat each word. The teacher introduced the LINCing Routine and provided an example of the LINCing Routine with a word. The students repeated the LINCing Routine as they were introduced. After calling on students for the new words and keywords, the teachers displayed the illustrations that accompanied the words on the Promethean Board and reviewed the complete strategy. Then, the teachers conducted a question-and-answer period in which the students could look at the illustrations as a form of guided practice. The teachers also gave the students a sentence and had them substitute various words and phrases using the new vocabulary words and keywords. Then, students worked on the independent practice on the five vocabulary words. On the next class period, the teachers conducted a review of the five vocabulary words. Students took a test on the words the following class period.

Both teachers administered weekly tests using formats that were equivalent across conditions. Specifically, the teachers provided students definitions and asked them to select the vocabulary word that matched each definition from a multiple-choice format. Students’ performance was recorded on the weekly assessment sheet (See Appendix K).
Measures

**All classrooms.** Students in all classes were given a pretest and posttest consisting of 20 questions from a released state standardized test to measure their academic performance of acquisition of vocabulary. The criterion for selecting questions from the state test was that the questions measured students’ vocabulary knowledge. A Strategy-Use Test was used to measure student knowledge of the strategy and the use of the LINCing Routine before and after instruction to determine whether students learned what they had been taught.

The Strategy-Use Test comprised of two forms (A and B) containing different words matched across the forms. A counterbalanced approach was used to control for difficulty of the forms. For the pretest, Form A was administered to half of the students, whereas Form B was given to the other half of the students. For the posttest, Form B was administered to students who completed Form A during the pretest; Form A was administered to students who completed Form B during the pretest. The words that appeared on the test were not the same nor were the words that appeared on different forms of each test. The Strategy-Use Tests are designed to measure student use of the strategy learned, and not their knowledge of the meaning of words.

The Strategy-Use Tests were adapted from a previous study and the words were chosen because their characteristics fit the strategies used. For example, the words on the LINCing Test had word parts for which students would be able to think of Reminding Words. All the words were words found in textbooks related to vocabulary learning that had been specified as difficult words. The first three items provided LINCS Tables, each containing a word and its definition. Students recorded a Reminding Word, created a brief LINCing Story, and drew a picture for each word. The last four items required students to provide rules for creating good Reminding Words, LINCing Stories, and pictures, and to write the steps of the Vocabulary LINCing
Routine. The first three items on this test were each worth 6 points (2 points for each part of the LINCS Table). The last four items were awarded a total of 8 points. The total number of 20 points for was the value of the entire test. An answer key was used to score each of the Strategy-Use Tests. The Strategy-Use score was the total points earned on a given test.

**LINCing Routine.** A fidelity checklist (See Appendix I) was used to assess what extent the delivery of the intervention (i.e., LINCing Routine) adhered to the protocol. The checklist consisted of ten items, representing all the instructional practices associated with a given strategy. Each of the items specified a teacher behavior, such as cueing students to fill in the device or modeling each sequential step of the strategy. One point was given for each item correctly performed. Independent scorers were used to rate the teachers’ behaviors as they delivered the intervention using the fidelity checklist provided.

**Inter-Observer Reliability and Social Validity.** Inter-observer reliability was determined by having independent scorers score randomly selected video-taped recording of the observed lessons. The scorers were blinded to the purpose of the study, the assignment of the students, and the time of testing (pretest vs. posttest). A side-by-side item analysis was used to determine agreements for each instrument. Interrater reliability checks were conducted on randomly selected videotaped class sessions. A percentage score was calculated from scores derived from Rater 1 and Rater 2 observing the same class session. Social validity data were collected at the end of the study (See Appendix M & N).

All mastery checks were graded by an independent observer to ensure that these had reached 100% accuracy and 100% strategy use. Since inaccurate computation was taken into consideration, meaning a computational-type error did not automatically produce an incorrect response when determining correct use of strategies if all other components of the LINCing
Routine were correct, mastery checks were graded separately by the primary researcher and compared the assessment scores to produce a reliability measure. A criterion level of 85% and above inter-observer agreement was established to ensure accuracy of data collected. Inter observer agreement was calculated by reporting agreements on occurrences or accuracy divided by agreements plus disagreement (A/[A+D]) multiplying by 100.

A social validity survey was administered to both teachers and students upon completion of the study. This survey was comprised of six questions with a five-point Likert scale to measure attitude toward and usefulness of LINCing Routine. Social validity measured the participants’ attitudes and perceptions of the LINCing Routine, including its perceived effectiveness, feasibility of use, and potential of future use by the participants. These factors are related to socially important outcomes, a quality indicator for single subject research (Horner et al., 2005).

**Data Analysis**

Data from pretest, posttest, weekly assessment, and strategy-use tests for each student, and performance feedback on teacher coaching were collected, graphed, and assessed for purposes of formative evaluation. Summative, visual analyses were conducted on graphs to determine level change, trend, and variability, in order to ultimately determine if a functional relation existed between the independent and dependent variables and effect sizes.

Pretest, posttest and Strategy-Use Tests comparisons were also used to examine summative growth in mastery across time. Each weekly assessment was tallied and analyzed. The performance between groups was determined by using descriptive statistics and correlation.
Summary

This chapter outlined the methodology for this dissertation research examining the effects of teacher coaching in the LINCing Routine on the vocabulary knowledge of secondary students with disabilities. It included the research questions and a description of the research design. It also provided detailed information about the participants, the materials used, and the procedures. Inter-observer agreement, procedural fidelity, and social validity were also explained. Finally, it outlined the formative and summative assessments and data analyses used to evaluate intervention effects.
CHAPTER 4

RESULTS

This study examined the effectiveness of teacher coaching in the use of the LINCing Routine on the vocabulary knowledge of secondary students with disabilities. This chapter is organized around the two research questions posed in Chapter 1. First, it examines whether teacher coaching in the use of the LINCing Routine improves the vocabulary knowledge of secondary students with disabilities in special education classrooms. Secondly, it examines if improvement in the vocabulary knowledge of secondary students with disabilities was related to the frequency of teachers’ use of explicit instruction of the LINCing Routine during classroom activities. Results are provided to answer both research questions and are discussed separately.

A pretest-posttest time series design was used with random assignment of three special education classrooms to the following conditions: (a) teacher coaching (training plus performance feedback), teacher was trained on the LINCing Routine and was provided with performance feedback on a weekly basis on the performance feedback checklist and (b) no coaching – teacher was trained on the vocabulary LINCing Routine, but did not receive coaching support. Class A and Class B were taught by one teacher who did not receive the coaching. Class C was taught by one teacher who did receive coaching.

The research took place over a 4-6-week period. Two special education teachers and 26 high school students in grades 9-12 receiving instruction in self-contained special education classrooms in a southeastern high school participated in this study. Pretest and posttest data were collected on each student and by classes. In addition, data were collected on students’ performance on weekly assessments and their strategy use was evaluated at the beginning and end of the study. Teacher performance feedback checklists were collected for one teacher who
received coaching by the researcher on a weekly basis, and a social validity survey was
distributed to both teachers and students at the end of the study. Teacher (T1) who taught Class
A and Class B did not receive coaching feedback, and teacher (T2) who taught Class C received
coaching feedback.

**Research Question 1**

*Will teacher coaching in the use of the LINCing Routine improve the vocabulary
knowledge of secondary students with disabilities in special education classrooms as
measured by a significant difference between pretest-posttest performances on selected
assessments?*

**Visual Analyses of Data**

Pretest, posttest, and strategy use test for each class are discussed. Refer to *Figure 4.1* for
a graph of the results and to Table 4.1 for the means across classes.

**Pretest.** The analyses of within-condition between classes indicated consistent scores
across all three classes. Class A and Class B were taught by the same teacher (T1) and Class C
was taught by another teacher (T2). The analyses of within-condition between the two teachers
showed that students from Class C had a higher mean score (mean = 9.00) than the students from
the other two classes.

**Posttest.** The analyses of within-condition showed an increase from the pretest scores.
Class A and Class B were taught by T1 and Class C was taught by T2. The analyses of within-
condition between the two teachers indicated that Class A resulted in a higher mean score (mean
= 10.55) than Class B and Class C.

**Strategy-Use Test.** The analyses of within-condition showed an increase from the
administration of the first Strategy-Use Test to the second administration at the end of the study
for all three classes. Class A and Class B were taught by T1 and Class C was taught by T2. The analyses of within-condition between the two teachers revealed that Class C resulted in a higher mean score on the use of the strategy than Class A and Class B.

**LINCing Routine Use.** Results are reported by class and teachers.

**Class A.** The mean score on the use of the LINCing strategy increased an average of 1.33 points from the first administration of the Strategy-Use Test as compared to the second administration (mean = 15.22; mean = 16.55). This is an 8.7% increase from first administration as compared to the second administration. Also, the mean score of students’ vocabulary performance on the posttest increased an average of 1.89 points as compared to the pretest (mean = 8.66; mean = 10.55). This is a 21.8% increase from pretest to posttest.

**Class B.** The mean score on the use of the LINCing strategy increased an average of 2.00 points from the first administration of the Strategy-Use Test as compared to the second administration (mean = 10.90; mean = 12.90). This is an 18.3% increase from first administration as compared to the second administration. Also, the mean score of students’ vocabulary performance on the posttest increased an average of 1.46 points as compared to the pretest (mean = 7.54; mean = 9.00). This is a 19.4% increase from pretest to posttest.

**Class C.** This teacher received weekly coaching performance feedback. The mean score on the use of the LINCing strategy increased an average of 5.33 points from the first administration of the Strategy-Use Test as compared to the second administration (mean = 13.50; mean = 18.83). This is 39.5% increase from first administration as compared to the second administration. Also, the mean score of students’ vocabulary performance on the posttest increased an average of .33 points as compared to the pretest (mean = 9.00; mean = 9.33). This is
a 3.66% increase from pretest to posttest. The class improved more on the use of the strategy as compared to the improvement of the pretest and posttest vocabulary knowledge.

**Summary of analyses between conditions.** Since baseline and intervention phases were stable within conditions for all classes, the relative and absolute changes for all classes between conditions increased from 0% to 39.5%, demonstrating an improvement. Correlation coefficients were computed among the pretest and posttest scores and the first administration and second administration of the strategy-use test scores. Using the Bonferroni approach to control for Type 1 error across the 10 correlations, a \( p \) value of less than .005 (.05/10 = .005) was required for significance. The results of the correlational analyses between pretest and posttest scores were not statistically significant and there is no relationship to pretest to posttest scores. However, there is an overall improvement from first administration of the strategy-use test to the second administration of the strategy-use test of \( p \) value of .335.

**Summary of analyses across conditions.** As noted above, all conditions before the intervention for all three classes were similar, showing no use of LINCing strategy to support vocabulary instruction prior to intervention and no teacher coaching. When comparing intervention conditions for all three classes, the mean for all classes indicated growth from 0% baseline to a range of 3.66% to 39.5% during intervention.

**Summary of visual analyses of data.** Between conditions and across conditions analyses reveal the presence of a functional relationship between the pretest and posttest and use of the LINCing strategy. When analyzing the data within conditions, a mean ranging from 3.66%–39.5% for the intervention phases was noticed. Between conditions analyses showed positive changes in relative and absolute levels from no intervention to intervention for all participants.
Figure 4.1

Mean Raw Scores and Standard Deviation by Class for the Pretest, Posttest, and Strategy-Use Test

![Bar chart showing mean raw scores and standard deviation by class for the Pretest, Posttest, and Strategy-Use Test]

Table 4.1

Mean Raw Scores and Standard Deviation by Class for the Pretest, Posttest, and Strategy-Use Test

<table>
<thead>
<tr>
<th></th>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pretest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>8.66</td>
<td>7.54</td>
<td>9.00</td>
</tr>
<tr>
<td>SD</td>
<td>2.50</td>
<td>4.15</td>
<td>3.85</td>
</tr>
<tr>
<td><strong>Posttest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>10.55</td>
<td>9.00</td>
<td>9.33</td>
</tr>
<tr>
<td>SD</td>
<td>2.69</td>
<td>3.89</td>
<td>3.26</td>
</tr>
<tr>
<td>Percentage Increase</td>
<td>21.8%</td>
<td>19.4%</td>
<td>3.66%</td>
</tr>
<tr>
<td><strong>Strategy-Use Test 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>15.22</td>
<td>10.90</td>
<td>13.50</td>
</tr>
<tr>
<td>SD</td>
<td>6.47</td>
<td>6.83</td>
<td>7.15</td>
</tr>
<tr>
<td><strong>Strategy-Use Test 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>16.55</td>
<td>12.90</td>
<td>18.83</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>SD</td>
<td>5.13</td>
<td>4.52</td>
<td>.75</td>
</tr>
<tr>
<td>Percentage Increase</td>
<td>8.7%</td>
<td>18.3%</td>
<td>39.5%</td>
</tr>
</tbody>
</table>

Total Participants \((N = 26)\) 

9 

11 

6

Research Question 2

Will improvement in the vocabulary knowledge of secondary students with disabilities as measured by pretest-posttest change scores be related to the frequency of teachers’ use of explicit instruction of the LINCing Routine during classroom activities?

Visual Analyses of Data

Pretest, weekly assessments, posttest and teacher performance for each class are discussed. Refer to Figure 4.2 and 4.3 for a graph of the results and Table 4.2 and Table 4.3 for the means and range across conditions.

Class A. Visual analyses of within-condition phases indicated that the class on the weekly assessments showed a median of 81%, with a mean of 81%, and a range of 75%-87% correct responses. Also, the mean score on the posttest increased an average of 1.89 points as compared to the pretest (mean = 8.66; mean = 10.55). This is a 21.8% increase from pretest to posttest.

Class B. Visual analyses of within-condition phases indicated that the class on the weekly assessments showed a median of 75.4%, with a mean of 74%, and a range of 64%-87% correct responses. The mean score on the posttest increased an average of 1.46 points as compared to the pretest (mean = 7.54; mean = 9.00). This is a 19.4% increase from pretest to posttest.
**Class C.** Visual analyses of within-condition phases indicated that the class on the weekly assessments showed a median of 88%, with a mean of 91%, and a range of 80%-97% correct responses. The mean score on the posttest increased an average of .33 points as compared to the pretest (mean = 9.00; mean = 9.33). This is a 3.66% increase from pretest to posttest. The class improved more on the use of the strategy as compared to the improvement of the pretest and posttest performance.

**Across similar conditions for all classes.** When comparing all classes across conditions for initial accurate use of the LINCing Routine, there is an increase on mean of 8.7% to 39.5%. While all class showed some level of improvement, Class C showed more variability level for strategy use. The means scores showed growth for all classes during intervention, ranging from 3.66%-39.5%. Correlation coefficients were computed among the change scores from pretest to posttest scores. The results of the Bivariate Correlation between the change scores from pretest to posttest indicated no significant relationship between amount of coaching on change of student scores in Class C, (r(26) = .442, p = .456).

**Summary of visual analyses.** Analyses between conditions and across similar conditions analyses revealed the presence of a functional relation between the interventions of the LINCing Routine as evidences by increased performance from pretest to posttest. The presence of a functional relation between the accuracy on the use of the LINCing Routine and teacher coaching was evidenced by the increase performance from the first administration of the Strategy-Use Test as compared to the second administration of the Strategy-Use Test. When analyzing the data within conditions, a mean score increased ranging from 3.66%-21.8% for the intervention phases. Between conditions analyses showed positive changes in relative levels from baseline to intervention. The results of the correlational analyses between pretest and
posttest change scores were not statistically significant and there was no relationship to pretest to posttest scores. However, there was an overall improvement from first administration of the strategy-use test to the second administration of the strategy-use test of $p$ value of .039 for students with learning disability as compared to the other disability categories in this study.

Figure 4.2.

*Mean Raw Scores and Standard Deviation for the Weekly Assessments, Pretest, Posttest, and Strategy-Use Test*

![Graph showing mean raw scores and standard deviation for weekly assessments, pretest, posttest, and strategy-use test.]

Table 4.2

*Mean Raw Scores and Standard Deviation for the Weekly Assessments, Pretest, Posttest, and Strategy-Use Test For All Three Classes*

<table>
<thead>
<tr>
<th>Category</th>
<th>Means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>3.57</td>
<td>1.14</td>
</tr>
<tr>
<td>Week 2</td>
<td>3.88</td>
<td>1.36</td>
</tr>
<tr>
<td>Week 3</td>
<td>4.15</td>
<td>.88</td>
</tr>
<tr>
<td>Week 4</td>
<td>4.46</td>
<td>.76</td>
</tr>
<tr>
<td>Pretest</td>
<td>8.26</td>
<td>3.50</td>
</tr>
<tr>
<td>Posttest</td>
<td>9.62</td>
<td>3.32</td>
</tr>
</tbody>
</table>
Strategy-Use Test 1  13.21  6.78
Strategy-Use Test 2  16.09  4.76

Total Participants (N = 26)

Figure 4.3

Mean Raw Scores and Standard Deviation by Class for the Weekly Assessments

Table 4.3

Mean Raw Scores and Standard Deviation by Class for the Weekly Assessments

<table>
<thead>
<tr>
<th>Category</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A</td>
<td>3.77</td>
<td>4.00</td>
<td>4.11</td>
<td>4.33</td>
</tr>
<tr>
<td></td>
<td>1.09</td>
<td>1.11</td>
<td>1.05</td>
<td>.86</td>
</tr>
<tr>
<td>Class B</td>
<td>3.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>3.36</td>
<td>1.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td>3.90</td>
<td>.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>4.36</td>
<td>.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Class C

<table>
<thead>
<tr>
<th>Week 1</th>
<th>4.00</th>
<th>.89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 2</td>
<td>4.66</td>
<td>.51</td>
</tr>
<tr>
<td>Week 3</td>
<td>4.66</td>
<td>.51</td>
</tr>
<tr>
<td>Week 4</td>
<td>4.83</td>
<td>.40</td>
</tr>
</tbody>
</table>

Total Participants ($N = 26$)

Teacher Performance Results

**Teacher Feedback.** Data were collected using Weekly Teacher Coaching Performance Feedback Checklist after initial training. This is a reflection tool for the teacher after each instruction. Pre and post conferences were conducted with the teacher to determine her perceptions of vocabulary instruction skills, her attitudes toward vocabulary instruction, and her knowledge of the application of Mnemonic and Content Enhancement Strategies. It was hypothesized that weekly teacher coaching would increase the implementation fidelity of the strategy taught in the classroom (see Table 4.4). There was a total of four meetings with the teacher (T2).

The first section on the Teacher Coaching Performance Feedback was focused on the teacher’s understanding of initializing the instructional process to include naming the LINCing Routine or the LINCing Table, explaining how they would help students learn and specifying what students needed to know to use the strategy. The second section focused on knowing all the step of the LINCing Routine and how it must be implemented. The last section focused on how the teacher checked for student understanding. The teacher scored a total 0 points out of a possible 10 points on the initial conference. Following intervention, teacher scored 6 points out
of a possible of 10 points. Second meeting, teacher scored 7.5 points out of a possible of 10 points. Third meeting, teacher scored 8 points out of possible 10 points. On the final meeting, teacher scored 9 points out of 10 possible points.

Pre and post conferences and weekly teacher meetings demonstrated teacher’s stability in the fidelity of the implementation to the strategy. The teacher (T2) demonstrated gains in her knowledge of the strategy and reported using the LINCing Routine for vocabulary instruction.

Table 4.4

*Teacher Coaching Performance Feedback*

<table>
<thead>
<tr>
<th>Teacher 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 0</td>
</tr>
<tr>
<td>Week 1</td>
</tr>
<tr>
<td>Week 2</td>
</tr>
<tr>
<td>Week 3</td>
</tr>
<tr>
<td>Week 4</td>
</tr>
<tr>
<td>Mean</td>
</tr>
</tbody>
</table>

**Social Validity Survey Results**

Participants were given a social validity survey to determine their perceptions regarding ease of learning and use of the LINCing Routine and their perceptions of its practical application in vocabulary knowledge. Participants completed the six-question Likert-scale survey anonymously. The surveys were collected by the school secretary who passed all the surveys to the researcher. Surveys from two teachers and 24 students were returned. *Tables 4.5, 4.6, 4.7 and Table 4.8* show the results of the survey.
Results of the student survey revealed that students had positive perceptions of the use of LINCing Routine as a tool to help them understand vocabulary. For statements 1, 17 students agreed and strongly agreed (score of 4 or 5) that they liked learning how to use the LINCing Routine and that it was a helpful strategy, while seven students did not like learning the strategy. For statements 2 and 5, 21 students reported that they felt strongly that the reminding word help them remember the vocabulary word and believe other students should learn this strategy. 12 students found it difficult to learn the strategy. 13 students expressed that he or she would continue to use this strategy in the classroom. Class A and Class B are closer to the mean average of the all classes on the survey results. Consequently, Class C is above the mean average of all classes on all statements.

Results of the teacher survey revealed both teachers had positive perceptions of the use of LINCing Routine as a tool to help teach vocabulary. For statements 1 thru 4, both teachers strongly agreed that they understood the use of the LINCing Routine, the training was helpful, will continue to use it in their classroom and would likely share this strategy with another colleague. However, both teachers were in the middle of the scale with regards on if this strategy was overall effective on teaching students new vocabulary words. These results demonstrated a strong social validity of the LINCing Routine to the participants in this research.

Table 4.5

*Social Validity Results for Students in Class A*

<table>
<thead>
<tr>
<th>Social Validity Statements</th>
<th>Average Score (out of possible 5)</th>
<th>Average Score of All Classes (out of possible 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I liked learning the LINCing Routine</td>
<td>3.14</td>
<td>3.42</td>
</tr>
</tbody>
</table>
Creating my own reminding word, LINCing story, and LINCing picture helped me remember the vocabulary word.

It was difficult for me to learn the five steps of the LINCing Routine

I will create a reminding word, LINCing story and picture when I learn a new vocabulary word

I think other kids should be taught the LINCing Routine

I will continue to use the LINCing Routine

<table>
<thead>
<tr>
<th>Social Validity Statements</th>
<th>Average Score (out of possible 5)</th>
<th>Average Score of All Classes (out of possible 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I liked learning the LINCing Routine</td>
<td>3.45</td>
<td>3.42</td>
</tr>
<tr>
<td>Creating my own reminding word, LINCing story, and LINCing picture helped me remember the vocabulary word.</td>
<td>4.18</td>
<td>4.13</td>
</tr>
<tr>
<td>It was difficult for me to learn the five steps of the LINCing Routine</td>
<td>2.36</td>
<td>2.70</td>
</tr>
<tr>
<td>I will create a reminding word, LINCing story and picture when I learn a new vocabulary word</td>
<td>3.63</td>
<td>3.58</td>
</tr>
<tr>
<td>I think other kids should be taught the LINCing Routine</td>
<td>3.54</td>
<td>3.88</td>
</tr>
<tr>
<td>I will continue to use the LINCing Routine</td>
<td>2.90</td>
<td>3.30</td>
</tr>
</tbody>
</table>

Table 4.6

*Social Validity Results for Students in Class B*
Table 4.7

*Social Validity Results for Students in Class C*

<table>
<thead>
<tr>
<th>Social Validity Statements</th>
<th>Average Score (out of possible 5)</th>
<th>Average Score of All Classes (out of possible 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I liked learning the LINCing Routine</td>
<td>3.66</td>
<td>3.42</td>
</tr>
<tr>
<td>Creating my own reminding word, LINCing story, and LINCing picture helped me remember the vocabulary word.</td>
<td>4.16</td>
<td>4.13</td>
</tr>
<tr>
<td>It was difficult for me to learn the five steps of the LINCing Routine</td>
<td>3.50</td>
<td>2.70</td>
</tr>
<tr>
<td>I will create a reminding word, LINCing story and picture when I learn a new vocabulary word</td>
<td>3.83</td>
<td>3.58</td>
</tr>
<tr>
<td>I think other kids should be taught the LINCing Routine</td>
<td>4.00</td>
<td>3.88</td>
</tr>
<tr>
<td>I will continue to use the LINCing Routine</td>
<td>3.50</td>
<td>3.30</td>
</tr>
</tbody>
</table>

Table 4.8

*Social Validity Results for Teachers*

<table>
<thead>
<tr>
<th>Social Validity Statements</th>
<th>Teacher 1</th>
<th>Teacher 2</th>
<th>Average Score (out of possible 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I understand the LINCing Routine</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>The training to support implementation of the routine is effective</td>
<td>4.00</td>
<td>5.00</td>
<td>4.50</td>
</tr>
<tr>
<td>I would likely continue this routine with students in my class</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>I would likely share this routine with another colleague</td>
<td>4.00</td>
<td>5.00</td>
<td>4.50</td>
</tr>
<tr>
<td>My students with whom I worked understand the LINCing Routine</td>
<td>4.00</td>
<td>3.00</td>
<td>3.50</td>
</tr>
</tbody>
</table>
The LINCing Routine is effective in teaching students on vocabulary knowledge

---

**Procedural Fidelity and Inter-Observer Agreement**

All instructional sessions were videotaped. Treatment fidelity (both content and process) was assessed by an independent observer using a checklist created by the researcher to ensure that the teachers adhered to the content and intervention procedures. The independent observer viewed at least 85% of taped sessions for each teacher. Intervention sessions were randomly selected by using the Integer Generator on Random.org. The independent observer determined that the teachers followed the intervention checklist with 100% procedural fidelity.

A criterion level of 85% or above was established to ensure accuracy of data collected. Inter-observer agreement was calculated by reporting agreements of occurrences or accuracy divided by agreements plus disagreements (A/[A+D]). Inter-observer agreement was 91.5%.

**Conclusion**

In this chapter, the results of the dependent measures of increased performance on students’ vocabulary on pretest and posttest and Strategy-Use Test were summarized and reported. It was found that the independent measure of the LINCing Routine had a positive effect on both dependent measures. Both dependent variables showed gradual increase and remained stable throughout intervention. For each research question, the results were presented by classes and the overall summary of results for all participants was provided. For research question one, it was found that a percentage increase on the mean of all classes ranged from 8.7% to 39.5% for the intervention phase. Results on research question one, examining whether
teacher coaching on the use of the LINCing Routine improved students’ acquisition of vocabulary words, indicated that there may be a functional relation between teacher coaching and the use of LINCing Routine with fidelity. For research question two, it was found that a percentage increase on the mean of all three classes ranged from 3.66% to 21.8% for pretest and posttest. Results on research question two regarding the effectiveness of the LINCing Routine on increasing the students’ vocabulary knowledge indicated the possibility that the LINCing Routine with teacher coaching increased the overall accuracy of students’ vocabulary words learned.

In addition, qualitative data were gathered. The results of teacher performance feedback showed that the teacher increased her knowledge of the LINCing Routine. Both teachers and students reported high social validity for the intervention. Pretest and posttest results were also favorable. Students were able to more accurately answer vocabulary questions taken from released SOL tests, and demonstrated growth in overall vocabulary knowledge. Chapter 5 will discuss implications of these results along with recommendations for further research and concluding remarks.
CHAPTER 5

DISCUSSION

This chapter presents a summary of the study with a discussion of results and implications for practice and future research. Additionally, suggestions are offered regarding the potential impact of the results of this study for classroom application and recommendations for further research. Finally, limitations of the study also are discussed.

Summary of the Study

The purpose of this study was to extend previous research that suggested that mnemonic and content enhancement strategies and teacher coaching can be effective in teaching academic vocabulary to secondary students with disabilities. The strategy proposed for the current study was the LINCing Routine as a form of mnemonic and content enhancement strategy for vocabulary instruction. A pretest-posttest time series design controlling for teacher coaching was used to evaluate the effects of the LINCing Routine as a form of mnemonic and content enhancement intervention to support secondary students with disabilities while learning new academic vocabulary. Student performance was measured in terms of increased accurate use of the LINCing Routine and overall improvement of vocabulary knowledge while controlling for teacher coaching.

The hypothesis that the LINCing Routine would increase students’ vocabulary knowledge while they learned words and enhance students’ awareness of cognitive strategies which are explicitly taught using the LINCing Routine was confirmed. As previous research had limited focus on secondary students with disabilities, this study investigated the effectiveness of the LINCing Routine on the academic vocabulary knowledge of secondary students with disabilities.
The hypothesis that teacher coaching and explicit instruction of the LINCing Routine would increase vocabulary knowledge of secondary students with disabilities in special education classrooms was confirmed in this study. Visual analyses of the data from this study indicated that there is a functional relationship between the LINCing Routine and increased accurate use of cognitive strategies and overall accuracy in improving vocabulary knowledge. Furthermore, teacher performance feedback meetings and social validity surveys revealed that teachers and students valued the instruction and felt they would be able to make practical application of it.

The hypothesis that the LINCing Routine would support students in increasing their overall vocabulary knowledge was confirmed in this study. Visual analyses of the data of this study indicated that this study appears to have resulted in demonstrating a functional relation between the use of the LINCing Routine and improved vocabulary knowledge. Furthermore, pretest, posttest, weekly assessments, and strategy-use tests reinforced the results.

The results of this study are consistent with previous research findings that the effects of teaching high school students with and without disabilities a morphemic analysis strategy (word mapping) for analyzing and predicting the meaning of words against a mnemonic strategy (LINCS) by using a pretest-posttest comparison-group design to determine students’ strategy use and vocabulary knowledge (Harris et al., 2011). However, this investigation extended previous findings suggesting that the use of the LINCing Routine can be effective in teaching secondary students with disabilities in a special education classroom (Terrill et al., 2004; Fontana et al., 2007; Harris et al., 2011). The literature available on mnemonic strategy describes the use of key word method to increase vocabulary knowledge and whether mnemonic strategy instruction would facilitate learning in inclusive high school classes as compared to direct instruction;
however, in the current study, teacher coaching on the use of the LINCing Routine was used showing that it can be applied to secondary students with disabilities in special education classroom.

**Discussion of Results**

**Research Question One.** Will teacher coaching in the use of the LINCing Routine improve the vocabulary knowledge of secondary students with disabilities in special education classrooms as measured by a significant difference between pretest-posttest performances on selected assessments?

Visual analyses of performances for all classes during intervention, on pretests and posttests, weekly assessments, strategy-use tests and the outcomes of teacher coaching feedback meetings that included explicit use of cognitive strategies suggested that the use of LINCing Routine to increase vocabulary knowledge is an effective forum for improving students’ use of mnemonic and content enhancement strategies. Prior to intervention, participants’ baseline performance showed no use of these strategies. During intervention, participants were able to successfully implement the use of the LINCing Routine. Although some remediation was necessary, participants’ mean percentage increased ranging from 8.7% to 39.5%.

Instruction in the use of the LINCing Routine was included within the direct instruction. The LINCing Routine included activating prior knowledge (i.e., creating a reminding word, visualizing (i.e., constructing a picture), recalling (i.e., formulating a story), and self-test (i.e., reviewing the steps and ensuring it makes sense), all of which were explicitly taught through the use of the LINCing Routine protocol.

In an attempt to ascertain if LINCing Routine was useful to participants, the number of occurrences of the effective application of strategy used on the pretest and posttest comprised of
20 vocabulary questions taken from released SOL tests were tallied and analyzed. Accurate strategy use was compared with overall success in increasing vocabulary knowledge utilizing the strategy-use test were tallied and analyzed. As noted in Chapter 4, participants demonstrated growth on their vocabulary knowledge. However, participants varied widely in their use of the strategy on this measure. The weekly assessments by class demonstrated inconsistent use of the LINCing Routine which varied by each week. Participants found the LINCing Routine favorable.

Each lesson taught during the intervention phase of this study included a review of the steps. The participants experienced minimal difficulty creating a picture and the story. However, when identifying a reminding word, participants demonstrated moderate difficulty. For example, when asked to identify a reminding word for the word *streak*, participants had difficulty constructing a reminding word, such as *strike* or *strip*. The researcher conducting fidelity checks concluded that the words were age and grade appropriate. When further lessons were introduced, teachers provided more time for guided practice times to ensure students understood the steps and were able to use it. Much more work and time went into teaching participants to construct the LINCing Table than teaching participants the actual application of the LINCing Routine.

Participants loved drawing pictures for the word, but regularly took longer time to create the story. It is possible that this problem with creating the story may have been associated with the participants’ reading levels and prior knowledge. All students in this study were receiving specialized instruction in the area of reading in a special education classroom. The level of literacy of participants seems to be a crucial factor in participants’ ability to create a logical story.
The struggle with creating a story raises some questions: Is this weakness or lack of development in the area of language associated with, or separate from, the vocabulary weaknesses? Would the LINcing Routine have been more or less effective if vocabulary words were taken from the context of their reading comprehension passage? These questions need to be addressed in future research.

**Research Question Two.** Will improvement in the vocabulary knowledge of secondary students with disabilities as measured by pretest-posttest change scores be related to the frequency of teachers’ use of explicit instruction of the LINCing Routine during classroom activities?

Visual analyses of the data, along with pretest and posttest in the form of grade-appropriate word from released SOL tests suggested that the use of the LINCing Routine is an effective strategy for improving students’ vocabulary knowledge. After intervention, participants’ mean percentage increase ranged from 3.66% to 21.8%. All classes displayed accelerating trend lines, meaning that their performance increase over time. During intervention, participants were able to successfully and accurately learn 3 to 4 word per week during the four weeks of intervention. Although some remediation was necessary, all classes’ means ranged from 3.57 to 4.46 during intervention.

When answering posttest vocabulary questions from the sample released SOL, participants showed gains in accuracy, with a mean accuracy gain across participants of 14.95%. Participants also demonstrated gains between pretests and posttests with a mean gain of 1.37 points across participants. Despite these results, several questions regarding participants’ ability to use the LINCing Routine to improve vocabulary knowledge were raised.
Class C made the smallest gain between the pretest and posttest; however, Class C achieved the highest gain on the second administration of the Strategy-Use test, scoring a 39.5% percentage gain in mean score. Although the class size was much smaller than the other two classes, protocol was adhered to and work on the SOL posttest demonstrated a close adherence to the steps outlined in the LINCing Routine used throughout the lessons. This calls into question whether the protocol and LINCing Routine instruction served as a conceptual or procedural support for Class C. While LINCing Routine is a step in the protocol to assist as a procedure aid, it is possible it assists students to conceptualize words at correctly answering the question given. This would explain the disparity between the extremely modest gain in Strategy-Use Test scores of Class A and Class B compared to Class C.

**Behavioral Concerns.** It should be noted that there were behavioral concerns that impacted the performance of some participants, although no behavioral disabilities were recorded in the participants’ profiles. Class A and Class C demonstrated behaviors that negatively affected their mastery of some lessons/intervention sessions. At other times, participants would arrive agitated from situations that had occurred during that school day. On several occasions, some participants were easily distracted by another participant’s behavior and any sound outside of the room.

Most of participants’ failures on intervention probe were products of their lack of desire or refusal to complete the given probe, and it did not appear to be from a lack of understanding of the concepts taught. During remediation, participants often demonstrated an understanding of the lesson that had been taught previously on the same content.
Conclusions

Implications for practitioners’ use of the LINCing Routine in the classroom and recommendations for next steps in the research of the LINCing Routine will be discussed in this section.

Implications for Action. Since vocabulary instruction is an important component of reading instruction with which participants historically struggled, this research offers practical, long-term implications for the classroom. First, empirical evidence supports explicit instruction in the use of the LINCing Routine for participants who have difficulty with vocabulary knowledge, and because the LINCing Routine implicitly includes mnemonic and content enhancement strategies, emphasizing the connection between the two strategies which have historically been studied separately could increase the value of the LINCing Routine for educators.

The application of the LINCing Routine at the outset of learning new vocabulary word, such as identifying a reminding word which activates prior knowledge, supports the student in learning the new word and thinking about how the word can be used to create a picture and a story. It may train students to thoughtfully form their own procedural foundation for successfully learning the word. The goal of vocabulary instruction is to facilitate students’ ability to interact with language situations (Bryant et al., 2003; Jitendra et al., 2004). Vocabulary acquisition has been linked to working memory skills (Cain, Oakhill, & Lemmon, 2004). Because Students with disabilities have deficits in working memory capacity and other executive cognitive process, teachers should embed intentional instruction to include repetition and multiple exposures of content, incorporate active and engaging lessons, use of mnemonic memory strategy, and the use of computer technology in the classroom (Stetter & Hughes, 2010).
This research suggests that incorporating mnemonic and other strategies to support students’ learning may deserve more attention in the classroom, and this process may have to be explicitly taught.

Lastly, the generalizability of all components of the LINCing Routine for secondary students with disabilities could be used to support their understanding of their vocabulary knowledge. In this manner, students can build upon their prior knowledge to lay a foundation for higher level, more complex word in later grades. This could be generalized across content areas.

**Recommendations for Future Research.** Vocabulary acquisition has been linked to working memory skills (Cain et al., 2004). Because Students with disabilities have deficits in working memory capacity and other executive cognitive process, teachers should embed intentional cognitive strategies such as repetition and multiple exposures to content, incorporate active and engaging lessons, use of mnemonics, and computer technology in the classroom (Stetter & Hughes, 2010). In order for a student to grasp understanding, it is necessary to hold a mental model of the word in working memory while reading about it, make new connections, and revise understanding of the subject matter. Without these additional supports, students with disabilities often struggle to benefit from reading instruction that can positively affect their vocabulary and comprehension of grade-level materials (Boulineau et al., 2004; Faggella-Luby et al., 2007; Guthrie & Humick, 2004; Stetter & Hughes, 2010; Watson et al., 2012).

Since vocabulary knowledge has historically been a struggle for students with disabilities, this research could have practical, long-term implications for the classroom. First, the effectiveness of the LINCing Routine may be noticed and valued by practitioners since empirical evidence supports explicit instruction in the use of mnemonic and content enhancement strategies to facilitate vocabulary knowledge for secondary students with disabilities. The
LINCing Routine includes both mnemonic and content enhancement components which have typically been researched separately. Second, the application of a cognitive strategy at the outset of defining a word in the form of activating prior knowledge, visualizing, and recalling the definition of the word will support students in comprehending the vocabulary word. It may also train students to form their own foundation for successfully learning the word.

Third, it is important to identify the effectiveness of using the LINCing Routine with students who have been identified as LD. This has implications for Response to Intervention (RTI) models. If the strategy is effective for students with LD, it may be used in the general education classroom as Tier 1 as an evidence-based practice to support students who require explicit strategy instruction to acquire academic vocabulary.

Lastly, the generalizability of all components of LINCing Routine in comparison to traditional form of vocabulary instruction could mean that, students could be trained to use the routine to support their understanding of the vocabulary word and increase their vocabulary knowledge. Teachers could build on students’ learned strategic knowledge to gradually expand students’ academic vocabulary and teach them more complex words.

Further research should be conducted in which students’ cognitive skills, including working memory, are measured prior to intervention to determine if the LINCing Routine is effective depending on students’ cognitive skill levels. This could help determine whether the LINCing Routine serves as a conceptual rather than procedural tool for even low-performing students. This would also have implications for Response to Intervention (RTI) models since it would better inform educators which students may benefit from different kinds of supports, resulting in more time-efficient interventions. Further research could determine if direct
instruction in the LINCing Routine is most effective as a second-tier, small group, intervention or a more intensive third-tier level of remediation.

In conducting this study, the question was raised about including secondary students with disabilities in grades 9-12. The age range was too wide. As noted earlier, participants in this study struggled with reading and lacked cognitive strategies. This observation warrants further investigation. As noted previously, the LINCing Routine used for this research included the activation of prior knowledge, visualization, and recall of all of which are explicitly taught using the LINCing Routine. Further research could determine if grade level and students’ level of understanding cognitive strategies may affect their use of the LINCing Routine.

Limitations

The generalizability of the results is limited. This study was conducted with 26 students from 9-12 grades with age ranging from 14 years old to 19 years old. In addition, all participants were identified from five disability categories (e.g., Learning Disability, Emotional Disability, Other Health Impairment, Intellectual Disability, and Autism. Therefore, the results may not apply to students with other disabilities or from other grade level. Since the intervention was provided in three self-contained special education classrooms, the results may not be applicable to other types of school settings, such as inclusion classrooms or general education classrooms when instruction is given in larger groups. Attempt to conduct a strategy based intervention within the confines of a comprehensive school may be a limitation.

Also, since the study was conducted during the spring, from April to May, classroom preparation for reading SOL testing was a high priority in the setting in which the study was conducted. Some successful results attributed to the study, such as pretest and posttest results, could possibly have been a result of classroom activities, producing internal validity threats in the form of history and maturation.
All intervention lessons were taught by the teachers trained by the researcher. This could have affected the researcher’s attention during the intervention sessions and it may have influenced the participants’ performance more than the features of the intervention. The randomization of the teacher who received coaching may be a factor. The teacher who received coaching taught self-contained special education science class as oppose to the teacher who did not received coaching taught self-contained special education language arts classes. The different content areas of the self-contained special education classes may also be a factor on students’ performance outcomes. In addition, researcher bias is a realistic threat to the validity of the study.

The use of non-standardized testing instruments for pretest and posttest, weekly assessments, and Strategy-Use Test measures is another limitation. The tests and probes were constructed by the researcher based on released Virginia SOL vocabulary questions. Data collected with non-standardized instruments can be prone to errors (Mitchell & Jolley, 2013). Also, the use of four points across all groups and participants to avoid testing fatigue instead of increasing the number of points across groups and participants can be considered a limitation to the research.

In addition, the independent scorer responsible for determining inter-observer agreement and fidelity of the intervention throughout the study was from the same school where the study was conducted. It is conceivable that some bias could have occurred because of the friendship that existed between these individuals. Finally, since the teacher coaching on the use of the LINCing Routine was bundled into one intervention, it is not possible to determine the effectiveness of any of these components individually.
Conclusion

This research adds to the limited research on mnemonic and content enhancement strategies. The research suggests that teacher coaching on the use of the LINCing Routine could extend the current mnemonic and content enhancement strategies literature and serve as the next step in vocabulary instruction research. However, this study also highlights the need for more research on the best use of the LINCing Routine as an intervention in regards to RTI tiers in educational settings. Additional research is needed to determine which of the cognitive strategies included in this investigation were most effective, and whether or not any of the cognitive strategies used were ineffective. Despite these limitations, the results of this study suggest that explicit teaching of the LINCing Routine has the potential to enhance students’ awareness through the activation of prior knowledge, visualization, and recall of all of which are explicitly taught using the LINCing Routine. In addition, the LINCing Routine may lead to increased vocabulary knowledge for secondary students with disabilities.

Since vocabulary knowledge has historically been a struggle for students with disabilities, this research could have practical, long-term implications for the classroom. First, the effectiveness of the LINCing Routine may be noticed and valued by practitioners since empirical evidence supports explicit instruction in the use of mnemonic and content enhancement strategies to facilitate vocabulary knowledge for secondary students with disabilities. The LINCing Routine includes both mnemonic and content enhancement components, which have typically been researched separately. Second, the application of a cognitive strategy at the outset of defining a word in the form of activating prior knowledge, visualizing, and recalling the definition of the word will support the student in comprehending the vocabulary word. It may also train students to form their own foundation for successfully learning the word.
Third, it is important to identify the effectiveness of using the LINCing Routine with students who have been identified as LD. This has implications for RTI models. If the strategy is effective for students with LD, it may be used in the general education classroom as Tier 1 as an evidence-based practice to support students who require explicit strategy instruction to acquire academic vocabulary. Lastly, the generalizability of all components of LINCing Routine in comparison to traditional form of vocabulary instruction could mean that students could be trained to use the routine to support their understanding of the vocabulary word and increase their vocabulary knowledge. Teachers could build on students’ learned strategic knowledge to gradually expand students’ academic vocabulary and teach them more complex words.

Empirical studies have supported the use of mnemonic and content enhancement routines as instructional strategies to improve vocabulary knowledge. However, more studies incorporating both mnemonic and content enhancement routines and including secondary students with LD are needed. The LINCing Routine incorporates both types of recommended evidence-based practices. This study examined the effectiveness of the LINCing Routine in increasing the vocabulary knowledge of high school students with disabilities who were at risk of failing the state’s standard of learning test. There is a need for a study that introduces the LINCing Routine as an instructional strategy that uses mnemonic and a content enhancement routine which can positively contribute to the success of secondary students with disabilities by increasing their vocabulary knowledge, metacognition, and their ability to become independent learners giving them another tool for academic success.
References


## Appendices

### Appendix A

*Summary of Research on Vocabulary Instruction*

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Purpose of Study</th>
<th>Method</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradshaw, Pas, Bottiani, Debnam, Reinke, Herman, &amp; Rosenberg (2018)</td>
<td>Examined the impact of Double Check coaching over and above the five-part professional development series and SW-PBS activities. Using a teacher-level RCT (experimental) design in 12 elementary and middle schools.</td>
<td>Randomized control trial</td>
<td>They found evidence of significant added value associated with the Double Check coaching on our primary behavioral outcomes of interest, and observed teacher practices and student behaviors.</td>
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<tr>
<td>Clay, Zorfass, Brann, Kotula, &amp; Smolowski (2009)</td>
<td>Examined the effects of online vocabulary support tools, Visual Thesaurus (VT) and Merriam-Webster Online (MWO), on vocabulary and comprehension for students in inclusive social studies classrooms at the middle school level.</td>
<td>Randomized control trials.</td>
<td>Positive results were observed and students made gains in their knowledge of content from pretest to posttest. Vocabulary knowledge for MWO users made significant gains in round two. Content gain for both groups were statistically significant with students who used MWO showing greater gains.</td>
</tr>
<tr>
<td>Dexter &amp; Hughes (2011)</td>
<td>Examined peer coaching model</td>
<td>A meta-analysis</td>
<td>Across several conditions, settings, and features, the use of graphic organizers was associated with increases in vocabulary knowledge, comprehension, and inferential knowledge. Mean effect sizes varied from moderate to large based on type of measure, type of graphic organizer, and subject area.</td>
</tr>
<tr>
<td>Fontana, Scruggs, &amp; Mastropieri (2007)</td>
<td>Examined the effects of mnemonic strategies and direct instruction on learning in inclusive high school social studies classes.</td>
<td>A within-subjects crossover design.</td>
<td>This study found no statistically significant main effect or interaction effect on student performance on Unit 1 and Unit 2 tests. However, the cumulative multiple choice posttest yielded significant main effects for experimental condition. Students performed higher when in mnemonic condition than in the direct instruction condition.</td>
</tr>
</tbody>
</table>
### Summary of Research on Vocabulary Instruction (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fore, Boon, &amp; Lowrie (2007)</td>
<td>Examined the effects of two types of instruction (definition and concept model) on the learning of content-area vocabulary words for students with learning disabilities in the middle school level.</td>
<td>A multiple-baseline design across participants.</td>
<td>Results showed that the concept model had a greater effect upon the learning of content-area vocabulary words than the definition model for all students with learning disabilities.</td>
</tr>
<tr>
<td>Harris, Schumaker, &amp; Deshler (2011)</td>
<td>Tested the effects of teaching high school students with and without disabilities a morphemic analysis strategy for analyzing and predicting the meaning of words.</td>
<td>A comparison-group design was used with random assignment of three intact classes to each of two conditions: (a) the word mapping condition (morphological analysis); and (b) the vocabulary LINCing condition (mnemonic strategy).</td>
<td>Both groups made significant and comparable gains on the strategy-use test, word knowledge test, and morphological analysis test. All reflected medium to large effect sizes. Also, both groups made more significant gains in the word mapping condition than the vocabulary LINCing condition.</td>
</tr>
<tr>
<td>Hemmeter, Hardy, Schnitz, Adams, &amp; Kinder (2015)</td>
<td>This study examined the effects of a professional development intervention on teachers’ implementation of practices related to the Pyramid Model for Promoting Social-Emotional Competence in Young Children, as well as the extent to which teachers generalized and maintained those practices.</td>
<td>Multiple Probes Design Across three teachers</td>
<td>All teachers in this study increased their use of targeted teaching practices. Thus, there were nine demonstrations/replications across the three teachers, establishing a functional relation.</td>
</tr>
<tr>
<td>Mason, Schnitz, Willis &amp; Rosenbloom (2017)</td>
<td>Investigated the impact of online instructional modules and a Practice-Based Coaching (PBC) model with teacher-as-coach on their paraprofessionals’ fidelity of discrete trial training (DTT).</td>
<td>Multiple baseline across five teachers</td>
<td>Implementation of the instructional modules yielded little to no change in paraprofessionals’ DTT fidelity, however, a clear functional relation between PBC and improvement in paraprofessionals’ fidelity of implementation of DTT was demonstrated.</td>
</tr>
<tr>
<td>Retter, Anderson, &amp; Kieran (2013)</td>
<td>Explored the use of iPad 2 in conjunction with Second Chance Reading program to determine academic gains in reading comprehension, reading fluency, and vocabulary for high school students with learning disabilities.</td>
<td>Simultaneous treatment design.</td>
<td>Results demonstrated minimal gains in the total number of vocabulary words learned and reading fluency and a significant gain in reading comprehension. Informal observation noted higher student engagement and reduction in student behaviors (off-task, noise level, and inappropriate behaviors).</td>
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<tr>
<td>Study</td>
<td>Methodology</td>
<td>Findings</td>
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<tr>
<td>Seifert &amp; Espin (2012)</td>
<td>Examined the effects of three types of reading interventions (text reading, vocabulary learning, and text reading plus vocabulary learning) on science text reading for secondary students with learning disabilities. Using within-subjects design. Results revealed that text-reading and combined interventions had a positive effect on reading fluency and vocabulary knowledge.</td>
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<tr>
<td>Shook, Hazelkorn, &amp; Lozano (2011)</td>
<td>Tested the effect of Collaborative Strategic Reading (CSR) to enhance science vocabulary for students in inclusive biology classes at the high school level. Using within-subjects design. Results indicated an increase in the median vocabulary quiz scores for students with and without disabilities.</td>
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<tr>
<td>Terrill, Scruggs, &amp; Mastropieri (2004)</td>
<td>Investigated the effects of mnemonic strategy (keyword method) and traditional instructional approaches to increase vocabulary learned for high school students with learning disabilities. Repeated-measure design. The students’ vocabulary recall was greater in the mnemonic condition than in the nonmnemonic condition. The result yielded statistically significant differences, 𝜋(7) = 7.74, 𝑝 &lt; .001. Individual student scores in each condition revealed that all students scored higher on vocabulary tests when in the mnemonic condition.</td>
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<tr>
<td>Wood, Mustian, &amp; Cook (2012)</td>
<td>Examined the effects of whole-word vocabulary instruction and morphograph instruction on students’ vocabulary acquisition and generalization through the use of a computer-assisted peer-tutoring program. Simultaneous treatment design. Results indicated seven of the eight students acquired more total vocabulary words and a higher percentage of vocabulary in the morphograph condition.</td>
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Appendix B

Parent Letter

January 22, 2018

Dear Parents,

Your child is being offered the opportunity to participate in a research project investigating the effects of teacher coaching and the LINCing Routine on the vocabulary knowledge of secondary students. The purpose of this research is to examine if the impact of teacher coaching and explicit instruction of the LINCing Routine will increase vocabulary knowledge of secondary students.

All information obtained about your child in this study is strictly confidential unless disclosure is required by law. The results of this study may be used in reports, presentations and publications, but the researcher will not identify your child. Your child’s participation in this study is voluntary and you may choose to discontinue the participation at any time without penalty. Refusal to participate will not result in any penalty or loss to you. Your decision will not affect your relationship with the school, or otherwise cause a loss of benefits to which you might otherwise be entitled.

If you have any questions pertaining to the research study, please feel free to contact Dana Cho at 757-339-3494. We thank you in advance for taking the time to consider your participation in this study.

Sincerely,

Dana W. Cho
Appendix C

Teacher Consent Form

TEACHER CONSENT DOCUMENT
OLD DOMINION UNIVERSITY

PROJECT TITLE: The Effects of Teacher Coaching and the LINCing Routine on the Vocabulary Knowledge of Secondary Students with Disabilities.

RESEARCHERS
Silvana Watson, Ph.D. and Dana Cho, M.S. Ed.

DESCRIPTION OF RESEARCH STUDY
To study the effects of teacher coaching and the LINCing Routine on the vocabulary knowledge of secondary students with disabilities, each participant will be taught this strategy for a period of 4-6 weeks. At the end of each week, participants will be taking a formal assessment. A video recording direct observations of teacher instructional delivery will be employed to collect data on fidelity of the strategy. A 10-inch video camera will be turned on and turned off once every two weeks. The video camera will be placed on a shelf overlooking the teacher. Each participant will be assigned an ID number instead of names.

You are being offered the opportunity to participate in a research project investigating the effects of teacher coaching and the LINCing Routine on the vocabulary knowledge of secondary students with disabilities. The purpose of this research is to examine if the impact of teacher coaching and explicit instruction of the LINCing Routine will increase vocabulary knowledge of secondary students with disabilities in special education classrooms.

All information obtained about you in this study is strictly confidential unless disclosure is required by law. The results of this study may be used in reports, presentations and publications, but the researcher will not identify you. Your participating in this study is voluntary and you may choose to discontinue your participation at any time without penalty. Refusal to participate will not result in any penalty or loss to you. Your decision will not affect your relationship with Old Dominion University, or otherwise cause a loss of benefits to which you might otherwise be entitled.

The data collected from this project will be used in planning informative presentations and to add to knowledge based in the field of special education on the impact of instructions in the classroom. If you have any questions or concerns about this research project, please call Dana Cho at (757) 339-3494 or Dr. Silvana Watson at (757)683-6364. If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should contact Dr. Jill Stefaniak, Chair of Darden College of Education Human Subject Review Committee, at (757) 683-3938, or Dr. Adam Rubenstein, Assistant Vice President for Research Compliance at the Old Dominion University Office of Research, at 757-683-3686.
By signing this form, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and its risks and benefits. The researchers should have answered any questions you may have had about the research. If you have any questions later on, then the researchers should be able to answer them.

And importantly, by signing below, you are telling the researcher YES, that you agree to participate in this study. The researcher should give you a copy of this form for your records.

<table>
<thead>
<tr>
<th>Subject's Printed Name</th>
<th>Date</th>
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<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td>Subject’s signature</td>
<td>Date</td>
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<tr>
<td>Witness' Printed Name &amp; Signature</td>
<td>Date</td>
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<td></td>
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</tbody>
</table>

INVESTIGATOR’S STATEMENT
I certify that I have explained to this subject the nature and purpose of this research, including benefits, risks, costs, and any experimental procedures. I have described the rights and protections afforded to human subjects and have done nothing to pressure, coerce, or falsely entice this subject into participating. I am aware of my obligations under state and federal laws, and promise compliance. I have answered the subject's questions and have encouraged him/her to ask additional questions at any time during the course of this study. I have witnessed the above signature(s) on this consent form.

<table>
<thead>
<tr>
<th>Dana Cho</th>
<th>January 18, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigator's Printed Name &amp; Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>
Appendix D

Sample Questions of Pretest and Posttest

1. Which is a negative connotation of the word \textit{prescribe}?
   a. Advise
   b. Dictate
   c. Specify
   d. Endorse

2. The word \textit{corrode} contains a root that means-----
   a. Destroy
   b. Damage
   c. Weaken
   d. Gnaw

3. What does \textit{humility} mean?
   a. Modesty
   b. Fatigue
   c. Novelty
   d. Poise

4. What does \textit{tranquil} mean?
   a. Calm or peaceful
   b. Difficult or challenging
   c. Fascinating or intriguing
   d. Zestful or energetic

5. What does the word \textit{listless} mean?
   a. Angry and stubborn
   b. Older and more mature
   c. Lacking energy and concern
   d. Cautious and shy

6. The word \textit{demoralized} mean------
   a. Carefully studied
   b. Taken away hope
   c. Greatly awakened
   d. Grown much worse
7. The word **icon** means--------
   a. Religious image
   b. Loyal friend
   c. Talented comedian
   d. Recognizable figure

8. What does the word **anonymous** mean?
   a. Not well written
   b. Late or incomplete
   c. Name not given
   d. Written by hand

9. The word **components** mean------
   a. Parts or sections of equipment
   b. Estimates of product quality
   c. Types of categories of objects
   d. Materials of considerable value

10. What does the word **bantering** mean?
    a. Chatting
    b. Practicing
    c. Disagreeing
    d. Competing

11. What does the word **radically** mean?
    a. Drastically
    b. Slowly
    c. Probably
    d. Easily

12. The word **formulate** means--------
    a. Figure out
    b. Take a vote on
    c. Decide against
    d. Run tests on

13. The word **impediments** refers to things that -----------
    a. Block the way
    b. Refresh a tired biker
    c. Make the pavement hot
    d. Announce road conditions
14. Read this sentence: The Amazon River **snakes** 4,000 miles through the South America.

   The word snakes is used to show that the Amazon River------
   a. Has the potential to cause harm
   b. Makes very little sound
   c. Flows at a very rapid pace
   d. Curves in its direction

15. What does the word **inducement** mean?
   a. Amusement
   b. Involvement
   c. Encouragement
   d. Treatment

16. What does the word **obsolete** mean?
   a. In superior condition
   b. Disabled or destroyed
   c. Dull and uninteresting
   d. Out of general use

17. What does **critique** mean?
   a. Award a grade to
   b. Add information to
   c. Make a judgement of
   d. Revise the order of

18. What does **dwindled** mean?
   a. Became known
   b. Remained strong
   c. Lessened gradually
   d. Listened silently

19. The word **renowned** means--------
   a. Talented
   b. Legendary
   c. Proud
   d. Noble

20. The word **belligerent** means------
   a. Hostile or argumentative
   b. Strangely familiar
   c. Weak or exhausted
   d. Strongly determined
Appendix E

Lesson Plan Example

Teacher introduced three vocabulary words from the story they will be reading as a warm-up. These words are projected on the Promethean Board in the form of vocabulary in context.

Example:

Vocabulary Words:

| Impulse | Apparent | Sullen |

Directions: Now, read the following sentences, and use the context clues to figure out which of the vocabulary words above goes in each blank.

1. Alfonso was ____________ because he was depressed about the condition of his bicycle and resentful of how Ernie had treated him.
2. Something inside Sandra urged her to speak to the boy, and before she knew it she had followed this ____________ and asked, “What’s your name?”
3. Ernie could see Alfonso’s ______________ frustration, and he finally agreed to let his younger brother use his bicycle.

Student completes this activity and as a class, the warm-up is reviewed.

Teacher will introduce the LINCing Routine and provide examples.

LINCing Routine

STEP 1: List the parts

STEP 2: Indicate a reminding word

STEP 3: Note a LINCing story

STEP 4: Create a LINcing picture

STEP 5: Self-test

Teacher will modeled the steps and completes couple of examples using the LINCS Table.
Example:

**Term**

**Rebel**

**Reminding Word**

**devil**

**Definition**

Someone who resists authority or control

**LINCing Story**

The teacher thought the kids were devils because they refused to follow the rules or obey her.

**LINCing Picture**

You are a bunch of little devils!

You refuse to obey!

---

The class will practice the LINCing Routine and complete couple of examples.

Student Independent work.

Now, students will complete five vocabulary words from the story on their own as teacher circulates round the room to provide assistance and answer questions.

Student is encouraged and reminded to adhere to the LINCing Routine Protocol.
Appendix F

Weekly Probe Tests Example

Directions: Read each sentence and select the correct meaning.

1. Concept "The concept of freedom is important to American culture."
   A. Payment  
   B. Place  
   C. Price  
   D. Principle

2. Era "The election of the new President marked a new era in US politics."
   A. Low  
   B. Plan  
   C. Choice  
   D. Age

3. Pursue "If you try to run away, we will pursue you."
   A. Hit  
   B. Let  
   C. Stop  
   D. Follow

4. Pioneer "Bill Gates was a pioneer of home computer software."
   A. Lawyer  
   B. Founder  
   C. Planner  
   D. Designer
5. Dominant: "Manchester United are the dominant team in British football."

A. Most exciting  
B. Youngest  
C. Strongest  
D. Oldest  

6. Display: "Shops display their best products in the window"

A. Sell  
B. Show  
C. Make  
D. Buy  

7. Decade: "She's been working here for a decade."

A. 1 year  
B. 5 years  
C. 1 month  
D. 10 years  

8. Numerous: "We've talked about this issue numerous times."

A. A few  
B. Many  
C. Some  
D. No
9. Eventually: "They eventually found the museum"
   A. With no problems
   B. In the end
   C. All of a sudden
   D. Very quickly

10. Orator: "Good leaders are usually good orators."
    A. Speakers
    B. Listeners
    C. Thinkers
    D. Fighters
Appendix G

Example of Strategy Use Test

Part I (12 Points)

Given the term and definition, provide the Reminding Word, LINCing Story and Picture.
Part II (8 points)

List the STEPs of the LINCing Routine

Provide one rule for the following:

Creating good reminding word

LINCing Story

LINCing Routine
## Appendix H

### LINCing Routine (Steps)

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1:</strong> List the parts</td>
<td>The first step is to write the name of the word or phrases in the space labeled “Term.” The class will learn about the word and write a brief definition in the space labeled “Definition.” The definition of the word is examined and unnecessary details are removed from the definition. This next job is to restate the definition as simply as possible.</td>
</tr>
<tr>
<td><strong>Step 2:</strong> Indicate a reminding word</td>
<td>It is create three types of memory devices. The first is called a “Reminding word.” The Reminding word will help with remembering the new word because it sounds like the new term. Next step is to identify a Reminding Word. To identify an effective Reminding word, real common word that sounds sort of like the term should be selected.</td>
</tr>
<tr>
<td><strong>Step 3:</strong> Note a LINCing story</td>
<td>Revisit the first two steps, then look at LINCing story which is another memory device. It should be short and contain the reminding word. It must contain the meaning of the term.</td>
</tr>
<tr>
<td><strong>Step 4:</strong> Create a LINcing picture</td>
<td>A LINCing picture is a simple picture that will help in remembering the meaning of the new term. Also, it must contain part related to the Reminding word and parts related to the important ideas in the definition.</td>
</tr>
</tbody>
</table>
**STEP 5: Self-test**

This is a check to make sure students can remember either the word or the meaning. There are two ways to self-test. First by beginning with the word and trying to come up with the definition. Second, by beginning with the definition and trying to come up with the word.

**Self-Test “Forwards”**
1. Say the new word
2. Say the Reminding Word
3. Think of the LINCing Story
4. Think of the LINcing Picture
5. Say the meaning of the new word.
6. Check to see if you’re correct

**Self-Test “Backwards”**
1. Say the meaning of the new word
2. Think of the LINcing Picture
3. Think of the LINCing Story
4. Think of the Reminding Word
5. Say the new word
6. Check to see if you’re correct

---

**Review & Debrief**

Ask questions to check for students’ understanding
- What is the name of the term we’ve been studying?
- What is the Reminding Word for this term? The LINCing Story? The LINcing Picture?
- How is the Reminding Word connected to the LINCing Story?
- What hints does the LINcing Picture contain about the word’s definition?
- When testing yourself about this word, how will you do it beginning with the word itself? How will you do it beginning with the definition?
### Example of LINCing Table

<table>
<thead>
<tr>
<th>Term</th>
<th>LINCing Story</th>
<th>LINCing Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reminding Word</strong></td>
<td>The teacher thought the kids were devils because they refused to follow the rules or obey her.</td>
<td><img src="image" alt="LINCing Picture" /></td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td>Someone who resists authority or control</td>
<td></td>
</tr>
</tbody>
</table>

### Example of LINCing Table with Word

<table>
<thead>
<tr>
<th>Term</th>
<th>LINCing Story</th>
<th>LINCing Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rebel</strong></td>
<td>The teacher thought the kids were devils because they refused to follow the rules or obey her.</td>
<td><img src="image" alt="LINCing Picture" /></td>
</tr>
<tr>
<td><strong>Devil</strong></td>
<td>You are a bunch of little devils! You refuse to obey!</td>
<td><img src="image" alt="LINCing Picture" /></td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td>Someone who resists authority or control</td>
<td></td>
</tr>
</tbody>
</table>
Appendix J

Teacher Coaching Performance Feedback (Cue-Do-Review Sequence)

<table>
<thead>
<tr>
<th>Date:</th>
<th>Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class:</td>
<td>Observer:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(CUE)</th>
<th>Teacher draws students’ attention to the use of the certain instructional process</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Naming the LINCing Routine or the LINCs Table</td>
</tr>
<tr>
<td>2.</td>
<td>Explaining how it will help them learn</td>
</tr>
<tr>
<td>3.</td>
<td>Specifying what they need to do</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(DO)</th>
<th>Teacher introduces the term and uses the LINCs steps.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Step 1: Listing the Parts</td>
</tr>
<tr>
<td>2.</td>
<td>Step 2: Identifying a Reminding Word</td>
</tr>
<tr>
<td>3.</td>
<td>Step 3: Noting a LINCing Story</td>
</tr>
<tr>
<td>4.</td>
<td>Step 4: Creating a LINCing Picture</td>
</tr>
<tr>
<td>5.</td>
<td>Step 5: Self-test</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(REVIEW)</th>
<th>Teacher checks student understanding by asking prompting questions to ensure understanding (what is step 1? What is a reminding word? How do you use the reminding word to recall the LINCing story?)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Not Observed (0)</th>
<th>Observed (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix K

#### Weekly Assessment Sheet

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 7</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 8</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 9</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student 10</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix L

Intervention Fidelity Checklist

<table>
<thead>
<tr>
<th>Date:</th>
<th>Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class:</td>
<td>Observer:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not Observed 0</th>
<th>Observed 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher demonstrates and instruct STEP 1 of the LINCing Routine (List the Parts) with fidelity</td>
<td></td>
</tr>
<tr>
<td>Teacher demonstrates and instruct STEP 2 of the LINCing Routine (Identify a Reminding Word) with fidelity</td>
<td></td>
</tr>
<tr>
<td>Teacher demonstrates and instruct STEP 3 of the LINCing Routine (Note a LINCing Story) with fidelity</td>
<td></td>
</tr>
<tr>
<td>Teacher demonstrates and instruct STEP 4 of the LINCing Routine (Create a LINCing Picture) with fidelity</td>
<td></td>
</tr>
<tr>
<td>Teacher demonstrates and instruct STEP 5 of the LINCing Routine (Self-test) with fidelity</td>
<td></td>
</tr>
<tr>
<td>Teacher asks prompting questions to ensure understanding (what is step 1? What is a reminding word? How do you use the reminding word to recall the LINCing story?)</td>
<td></td>
</tr>
<tr>
<td>Teacher offers appropriate feedback throughout the lesson.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix M

Social Validity Survey Teacher

Directions: Use the number lines below to show how much you agree or disagree with each of the statements below. Circle a number that best shows your opinion.

1. I understand the LINCing Routine

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

2. The weekly conferences and feedbacks to support implementation of the routine are effective.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

3. I would likely continue this routine with students in my class.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

4. I would likely share this routine with another colleague.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

5. My students with whom I worked understand the LINCing Routine.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

6. The LINCing Routine is effective in teaching students on vocabulary knowledge.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>
Appendix N

Social Validity Survey Students

Directions: Use the number lines below to show how much you agree or disagree with each of the statements below. Circle a number that best shows your opinion.

1. I liked learning the LINCing Routine.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

2. Creating my own reminding word, Lincing story, and LINCing picture help me remember the vocabulary words.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

3. It was difficult for me to learn the five steps of the LINCing Routine.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

4. I will create a reminding word, LINCing story and picture when I learn a new vocabulary word.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

5. I think other students should be taught the LINCing Routine.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

6. I will continue to use the LINCing Routine.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neither agree or disagree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>
Dana Wang Cho, M.S.ED  
648 Chesapeake Trail  
Virginia Beach, Virginia 23452  
W (757) 648-5146  
H (757) 339-3494  
Email: dana.cho@vbschools.com

EDUCATION:

2018 (Projected-August) Ph.D. Old Dominion University; Norfolk, VA; Education with emphasis on Special Education

2012 (August) Post Master’s Certification in Educational Leadership and Administration; George Washington University

2005 M.S. Old Dominion University; Norfolk, VA; Special Education with emphasis on Learning Disability, Emotional Disorder and Mental Retardation (PreK-12)

2003 B.A. Old Dominion University; Norfolk, VA, Political Science with minor in Spanish

Academic Experience:

2010 Designed and taught two graduate level special education classes; Old Dominion University

Non-Academic Experience:

2012-Present Assistant Principal at Virginia Beach City Public Schools

2010-2012 Alternate/Alternative Assessment Specialist; Virginia Grade level Assessment (VGLA), Virginia Modified Achievement Standards Test (VMAST), Virginia Substitute Evaluation Program (VSEP)—Virginia Beach City Public Schools

2012 Administrative Intern; Summer School at Tallwood HS

2011 Administrative Intern; Summer School at Landstown HS

2004-10 Special Education Teacher (Cross Category-LD/ED/MR);
Virginia Beach City Public Schools—7th and 8th grade Language Arts Teacher at Salem Middle School (inclusion and pull-out classes); Case manager of students and planning and developing IEPs for conferences to meet the individual needs of each student with disability.

2007-10 Chairperson for Virginia Grade Level Assessment
Virginia Beach City Public Schools—Provided School-wide training at Salem Middle School on procedures and collections of evidences

2008-09 Principal’s Advisory Committee (PAC); Virginia Beach City Public Schools—Member of this committee advised Principal on critical school issues at Salem Middle School.

2007-09 School Planning Council (SPC); Virginia Beach City Public Schools—Member of this committee with community members examined critical concerns of school.

2007-09 VGLA Scorer; Virginia Beach City Public Schools—Department of Research, Evaluation and Development trained scorer on Virginia Grade Level Assessment—scored several portfolio based assessment of students at Virginia Beach City Public Schools.

2005-09 Parents’ Day Committee; Virginia Beach City Public Schools—Registration Coordinator for the committee to promote awareness for parents to spend a day with their child at Salem Middle School

2004-09 SOL Tutor; Virginia Beach City Public Schools
SOL subject area tutoring of students before and after school

2007-08 Special Education Ad Hoc Committee; Virginia Beach City Public Schools—Committee to examine best practice models for school, enrollment, and scheduling at Salem Middle School

2005-08 Field Hockey Head Coach; Virginia Beach City Public Schools—Coaching and promoting good sportsmanship of students at Salem Middle School

**PUBLICATIONS:**

PAPERS PRESENTED AT PROFESSIONAL MEETINGS:

Watson, S., Morin, L., Reed, L., & Cho, D. “The role of working memory and attention in the teaching and learning process.” Presented to the International Conference for Exceptional Children (CEC); Denver, CO, April 14, 2012.


HONORS AND AWARDS:

2005-2010 I Make a Difference Award: Virginia Beach City Public Schools-Salem Middle School

2008-09 Tagged by the Superintendent; Virginia Beach City Public Schools

2008-09 Teacher of the year nominee for Salem Middle School; Virginia Beach City Public School

CERTIFICATION AND LICENSURE:

K-12 Special Education—LD/ED/MR
6-8 Middle School English

PROFESSIONAL SERVICE:

Membership in Professional Societies/Organizations:
2005-Present Member of CEC (Council of Exceptional Children)

2011-Present Member of CEC (Council of Exceptional Children)—Teacher Education Division

2011-Present Member of CEC (Council of Exceptional Children)—Council Of Administrators of Special Education
2011-Present  Member of CEC (Council of Exceptional Children)—Division for Learning Disabilities

2012-Present  VBASSP (Virginia Beach Association of Secondary School Principals)

COMMUNITY SERVICE:

Cho, D. (2010). Vanguard Schools Leadership Team: Members of this committee examine key initiatives related to the integration of instructional technology, balanced assessment, or responding to student needs in schools. Virginia Beach, VA.


Cho, D. (2008). MGT Special Education Audit Action Team: Member of this committee examined critical concerns of transition from middle to high schools. Virginia Beach, VA.
