

IMPACT OF VOCABULARY INSTRUCTION ON READING OUTCOMES

By

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## ABSTRACT

The current study investigated the effects of a two-part reading intervention on reading outcomes of a struggling reader using a single-subject design. One part of the intervention included direct-instruction through a manualized vocabulary program with an emphasis on morphology. The second part of the intervention included indirect-instruction through repeated reading of passages with phrase drill error correction. Outcomes were measured using three formative assessments (i.e., DIBELS Next oral reading fluency, DIBELS Next maze passages, and an affix identification task). Additionally, three summative measures of morphological awareness were used (i.e., nonsense word analysis, cloze sentences, and affix spelling). Additionally, participant perceptions of the program were collected using surveys both before and after the implementation of the program. Regarding his performance on the formative CBM assessment, the participant had a positive rate of improvement in the trend of the data from baseline through the intervention for both reading comprehension ( $g\text{-index} = 0.67$ ) and oral reading fluency ( $g\text{-index} = 0.33$ ). The participant also had improvements on formative measures of morphological awareness throughout the intervention. Regarding summative assessments, the participant made minimal gains on two of the pre/post morphological awareness measures. The participant reported negative perceptions of the intervention.

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## CHAPTER I: INTRODUCTION

### Overview

Approximately 31% of 4<sup>th</sup> graders and 28% of 12<sup>th</sup> graders read below a basic level (National Center for Education Statistics, 2015). Students with delays in reading have a limited knowledge of words compared to peers without delays in reading (Joseph, 2014). The goal of reading is to derive meaning from print. To achieve comprehension, it is necessary to master five critical skills of reading: (a) phonemic awareness; (b) alphabetic principle; (c) fluency; (d) vocabulary; and (e) comprehension (e.g., Joseph, 2014; National Reading Panel, 2000).

### Basic Word Reading

Problems with basic word reading are the most common form of learning disability (Fletcher, Lyon, Fuchs, & Barnes, 2007). Approximately 80-90% of children receiving special education services receive support in basic word reading. Basic word reading skills include the ability to identify and manipulate individual sounds of spoken words (phonemic awareness) and skills related to word recognition (Tennessee Department of Education, TDOE, 2017).

**Phonemic awareness.** Phonological awareness is a broad skill that involves the ability to identify and manipulate units of spoken language such as syllables and words (TDOE, 2017). Phonemes are the smallest units of sound in spoken language (Joseph, 2014). Phonemic awareness is a narrower component of phonological awareness which involves the ability to identify and manipulate phonemes. Examples of skills involved with phonemic awareness include the ability to identify the first sound in a word (alliteration), the ability to combine multiple sounds in a word (blending), the ability to separate individual sounds in a word (segmenting), and the ability to change or eliminate sounds in a word (manipulation). Phonemic

awareness has a direct and causal influence on word-level reading (Berninger & Wagner, 2008). Once students can identify and manipulate individual sounds, then they can begin to understand that these sounds can be represented in printed form (Fletcher et al., 2007).

**Word recognition skills.** The alphabetic principle is the understanding that printed letters have corresponding sounds (e.g., Fletcher et al., 2007; Joseph, 2014). The development of this understanding begins with simple one-to-one correspondences between letters and sounds (i.e. saying the individual sounds in the word *cat*, then blending the sounds together to form the word). Development continues with the recognition of more complex letter-sound associations and patterns (i.e. the vowel-consonant-*e* pattern in which the long vowel sound is used when the vowel is followed by a consonant and the letter *e*). Instruction of the alphabetic principle is crucial to students' overall reading abilities (Al Otaiba et al., 2008).

Phonics is a means of teaching letter-sound associations that begins with the alphabetic principle (Joseph, 2014; TDOE, 2017). Decoding is the ability to accurately pronounce sounds in a word (Joseph, 2014). With a better understanding of the alphabetic principle through phonics, students can apply previously learned patterns to decode unfamiliar words. Unfamiliar words become automatically recognizable as the alphabetic principle and decoding skills are established and the words are read repeatedly (Torgesen et al., 2001). Students who struggle with word recognition also tend to struggle with more advanced reading skills such as fluency and comprehension (e.g., Fletcher et al., 2007).

## **Fluency**

Fluency is the ability to read quickly, accurately, and with proper expression (e.g., Fletcher et al., 2007; Joseph, 2014; TDOE, 2017). Keeping in mind that the goal of reading is to gain meaning from the text, fluency can be viewed as the bridge to comprehension (e.g., Hosp & MacConnell, 2014; Joseph, 2015; Lane, 2014). When word recognition becomes automatic, greater cognitive resources can be devoted to higher order processing which in turn improves comprehension (Daly, O'Connor, & Young, 2014; Fletcher et al., 2007). In fact, Daly and colleagues note that research has consistently found a moderate correlation ( $\geq .60$ ) between measures of reading fluency and comprehension.

## **Comprehension**

Comprehension is the final goal of the reading process in which meaning is gained from text (e.g., Fletcher et al., 2007; Joseph, 2014; 2015; TDOE, 2017). Fletcher and colleagues (2007) noted, based on previous research, that 5 to 10% of students with age-appropriate word recognition abilities have poor reading comprehension skills. Good readers understand text structure, can identify main ideas, and make inferences based on the information they read (e.g., Fletcher et al., 2007; Joseph, 2015). Comprehension, therefore, is a complex process that involves activating prior knowledge, utilizing text comprehension strategies, and knowing the meanings of words. (e.g., Fletcher et al., 2007; Joseph, 2014; National Reading Panel, 2000).

**Vocabulary.** Vocabulary refers to understanding the meaning of words (e.g., Carlisle, 2010; Joseph, 2014). Vocabulary has been linked to comprehension and overall reading achievement (e.g., Biemiller, 2003; Joseph, 2014; Lane, 2014; National Reading Panel, 2000). Reading comprehension abilities are directly related to the number of words a student knows

(Biemiller & Boote, 2006). According to Biemiller (2003), both language interactions at home and vocabulary instruction in school impact the size of a child's vocabulary. Biemiller and Slonim (2001) found that the bottom quartile of second-graders knew approximately 2700 fewer word meanings than the top quartile. Around 3rd grade, a shift occurs in which students begin to increase their vocabulary primarily through reading (Joseph, 2015). Students with reading disabilities tend to have smaller vocabularies than students without reading disabilities (Biemiller, 2003). This is due, in part, to students with reading disabilities being exposed to less text and is especially true for older students. One strategy for increasing vocabulary is developing morphological awareness (e.g., Bowers, Kirby, & Deacon, 2010; Carlisle, 2010; Lane, 2014; Spencer et al., 2015).

**Morphological awareness.** Morphological awareness is the ability to conceptualize and manipulate the smallest units of meaning in language such as base words, prefixes, and suffixes (e.g., Apel, Brimo, Diehm, & Apel, 2013; Goodwin, 2015; Nagy, Berninger, & Abbott, 2006). There are two types of morphemes: (a) free morphemes; and (b) bound morphemes (Carlisle, 2003). Free morphemes are morphemes which function as meaningful words alone, but which may also be joined with other morphemes to form meaningful words (i.e., root words such as *play* or *run*). Bound morphemes require another morpheme to make a meaningful word (i.e., the prefix *pre-* or the suffix *-ing*). Over half of all English words are composed of multiple morphemes (Nagy et al., 2006). Furthermore, the academic vocabulary (i.e. *analytical*, *estimation*) characteristic of students' required reading past 3<sup>rd</sup> grade typically consists of morphologically complex words (e.g., Carlisle, 2003; Goodwin, 2015; Joseph, 2015).

Improved morphological awareness has been shown to lead to improvements in basic word reading, vocabulary knowledge, fluency, and comprehension (e.g., Bowers & Kirby, 2009; Bowers et al., 2010; Carlisle, 2010; Goodwin & Ahn, 2010; Reed, 2008). Through morphological processing (i.e. breaking down morphologically complex words into component prefixes, suffixes, or roots), students can decode unknown morphologically complex words leading to improved basic word reading (e.g., Carlisle, 2003; Goodwin, 2015). By understanding the meaning of component morphemes in morphologically complex words, students can infer the meaning of words which share these component morphemes (Carlisle, 2003). Strong correlations have been found between measures of vocabulary and morphological awareness (e.g., Kirby et al., 2012; Spencer et al., 2015). As students recognize known morphemes in unknown words, their ability to read these words quickly and accurately (i.e. fluency) also increases. (Nagy et al., 2006). With the understanding of more words and increase in fluency, students can devote more mental resources to the content of what they are reading, and their comprehension skills increase (e.g., Daly et al., 2014; Fletcher et al., 2007). Previous research has found that when vocabulary knowledge is controlled, morphological awareness accounts for a unique portion of variance in reading comprehension (e.g., Kirby et al., 2012; Nagy et al., 2006). Students with reading disabilities, however, commonly struggle with reading morphologically complex words (Carlisle, 2003).

### **Evidence-Based Interventions**

Since the goal of reading is comprehension, it is necessary to identify evidence-based strategies which lead to improvements. Edmonds and colleagues (2009) conducted a meta-analysis with the purpose of understanding what interventions affect reading outcomes for older

(grades 6 through 12) struggling readers. Results of this study indicate that explicit instruction led to improvements in comprehension for these students. Furthermore, results from this meta-analysis suggest that interventions which target multiple components of reading also lead to improved comprehension. Similarly, the National Reading Panel (NRP) noted that multiple methods of vocabulary instruction led to optimal learning (National Reading Panel, 2000). The NRP identified five primary methods of vocabulary instruction including (a) indirect instruction strategies and (b) explicit instruction strategies.

**Indirect instruction.** The NRP (2000) notes that vocabulary is often learned indirectly through circumstantial exposure to words, and that repeated exposure to words is critical to increases in student vocabulary. With indirect instruction, the student engages in large amounts of reading with the assumption that the student will draw inferences to the meanings of words which they do not know (National Reading Panel, 2000). One example of a method of indirect instruction is repeated reading. With repeated reading, the student continually rereads a short passage until a certain level of fluency is reached (Joseph, 2014). Repeated reading increases the opportunity for students to be exposed to unknown words, while simultaneously fulfilling the important requirement of repeatedly exposing students to words. The NRP found that repeated reading had a significant positive effect on student comprehension ( $\bar{d} = 0.35$ ) and suggested that repeated reading also may support gains in vocabulary. The study further determined that there are significant positive effects of improvements in students' fluency abilities through repeated reading ( $\bar{d} = 0.44$ ).

In a meta-analysis, Therrien (2004) found similar results to the study by the NRP. Therrien (2004) concluded that repeated reading improved reading fluency abilities in students

with reading problems ( $ES = 0.77$ ) and without reading problems ( $ES = 0.76$ ). Results also showed that repeated reading led to an increase in comprehension for both students with ( $ES = 0.59$ ) and without ( $ES = 0.48$ ) reading problems. Results from Therrien (2004) suggest that gains in fluency and comprehension from repeated reading may carry over to novel passages. Therrien (2004) further asserts that interventions which aim to improve fluency and comprehension also should include a corrective feedback component.

Joseph (2014) also notes that research shows that repeated readings are even more effective when combined with an error correction procedure. Alber-Morgan and colleagues (2007) examined the effect of repeated reading with an error correction procedure among middle school students with behavior problems, learning disabilities, or both. In this study, the students were asked to orally read a passage while the data collector recorded if the student accurately read each word. If a student misread a word, the data collector would read the word, ask the student to repeat the word, and offer praise upon student successfully repeating the word. After the passage was read completely by the student, the data collector would prompt the student to reread the initially misread words. The data collector offered praise upon the student successfully reading each previously misread word. Results from this study found that the repeated reading with error correction procedure resulted in increased levels of reading fluency and comprehension in these students.

Another example of an error correction procedure is the phrase drill error correction procedure (Joseph, 2014). In this procedure, the student orally reads passages while the teacher records any words read incorrectly. The teacher then models the correct reading of these words and asks the student to read phrases from the passage which contain the incorrect words. Begeny

and colleagues (2006) examined the effects of repeated readings with phrase drill error correction procedure (RRPD) with an 8-year-old boy with speech-language impairments and a learning disability in written expression. Begeny and colleagues (2006) found that RRPD resulted in a decrease in errors and an increase in rate of reading.

**Explicit instruction.** With explicit instruction, the student is directly given the definition or other component of a word, such as a morpheme (National Reading Panel, 2000). One example of this is explicit instruction of morphological awareness. Goodwin and Ahn (2010) conducted a meta-analysis on the effects of morphological interventions on literacy achievement. Seventeen independent studies met the criteria for inclusion in the meta-analysis. Participants in these studies were students with and without identified literacy disabilities including reading, learning, speech, and language disabilities in grades K through 12. The results of this meta-analysis showed that explicit morphological instruction resulted in medium mean effect sizes for vocabulary ( $\bar{d} = 0.49$ ) and a smaller effect for reading comprehension ( $\bar{d} = 0.20$ ). They also found that morphology instruction had a significant positive effect on vocabulary ( $\bar{d} = 0.40$ ).

Goodwin (2015) examined the effects of explicit morphological instruction embedded in comprehension instruction compared to comprehension instruction alone. Participants in this study consisted of 203 students in either 5<sup>th</sup> or 6<sup>th</sup> grades who were randomly assigned to receive explicit morphological instruction. Both groups received approximately the same amount of explicit instruction time for four 30-minute sessions across 2 to 4 weeks. More than 1/3 (43%) of students performed below the 25<sup>th</sup> percentile on the initial measure of comprehension abilities or below basic on a state standardized test. Results from this study showed that direct morphological instruction embedded in comprehension instruction led to improved vocabulary

knowledge when compared to comprehension instruction alone. Specifically, this study showed that students who receive explicit comprehension instruction with added morphological instruction showed gains in vocabulary ( $g = 0.41$ ) while still receiving approximately the same amount of time of instruction over a 2- to 4-week period.

In a pilot study, Brimo (2016) investigated the effects of explicit morphological awareness instruction on morphological awareness abilities in 3<sup>rd</sup> grade students with identified reading disabilities. Ten students were assigned to a treatment or control group based on pretest scores on a morphological awareness assessment to promote equivalence of groups. Students in the treatment group were pulled from class to receive 25-minute sessions of small-group (2 to 3 students) explicit morphological instruction three times a week for 10 weeks. Students in the control group remained in the class for typical instruction. The students were administered four assessments before and after the intervention to measure morphological awareness. The first of these assessments was the rehit task in which students' abilities to combine two real morphemes into a nonsense word and derive meaning from this new word. The second assessment, known as the relatives task, evaluated the students' ability to take a given base word and apply a self-generated morpheme to complete a cloze sentence. The affix identification task was the third assessment, and it gauged the students' ability to identify affixes of given words. The final assessment was the spelling multimorphemic words task. This task measured the students' ability to correctly spell affixes. Results from this study showed that the treatment produced a large effect on the rehit task ( $d = 2.58$ ) and the relatives task ( $d = 1.71$ ). Furthermore, the treatment produced a moderate effect on the affix identification task ( $d = 0.48$ ) and a small effect on the spelling multimorphemic words task ( $d = 0.28$ ). This indicates that explicit morphological

awareness instruction improves morphological awareness in 3<sup>rd</sup> grade students with identified reading disabilities.

## **Summary**

The goal of reading is to derive meaning from text. To do this, readers must develop five critical skills: (a) phonemic awareness; (b) alphabetic principle; (c) fluency; (d) vocabulary; and (e) comprehension (e.g., Joseph, 2014; National Reading Panel, 2000). Morphological awareness is the ability to conceptualize and manipulate the smallest units of meaning in language such as base words, prefixes, and suffixes. Improvements in morphological awareness have been found to lead to improvements in (a) basic word reading, (b) vocabulary, (c) fluency, and (d) comprehension (e.g., Bowers & Kirby, 2009; Bowers et al., 2010; Carlisle, 2010; Goodwin & Ahn, 2010; Reed, 2008). Studies have shown that the most effective strategies for increasing comprehension include using multiple methods such as indirect instruction and explicit instruction (e.g., Edmonds et al, 2009; National Reading Panel, 2000).

**Purpose of the Current Study.** The purpose of the current study was to examine the effects of a multi-element intervention incorporating indirect instruction through RRPD and explicit instruction of morphology on reading outcomes.

**Hypothesis 1.** The participant would show improvements in oral reading fluency and reading comprehension. Data collected from formative measures of oral reading fluency (DIBELS Next DORF) and reading comprehension (DIBELS Next Daze) would have a positive trend and a positive effect sizes. Effect sizes were calculated using the *g-index* and percent of non-overlapping data (*PND*).

***Hypothesis 2.*** The participant would show improvements in morphological awareness (i.e., affix identification task). Data collected from formative measures of morphological measures would show a positive rate of improvement.

***Hypothesis 3.*** The participant would report a positive view of the intervention, as evidenced by a post-intervention survey.

***Hypothesis 4.*** The participant would show improvements on pre/post intervention curriculum-based measures (i.e., Nonsense Word Analysis Task, Cloze Sentence Task, and Affix Spelling Task).

## CHAPTER II: METHODS

### Participant

The participant was an 8<sup>th</sup> grade student who was 14 years-old. He was receiving special education services for difficulties with reading in a rural middle school in the South. His instructional reading range was reported to be in the 4<sup>th</sup> grade level based on Aimsweb data. On DIBELS Next DORF (i.e., oral reading fluency), he was found to be instructional based on accuracy (reading between 93-97 wcpm in connected text) on 3<sup>rd</sup> grade passages; however, his fluency rate was below the 25%. This was the grade level used during the intervention for the formative assessments of reading fluency and reading comprehension as well as the passages used for the indirect intervention (i.e., repeated reading with phrase drill error correction).

### Measures

**Progress monitoring assessments.** Progress monitoring assessments are used to evaluate the degree to which an intervention is impacting targeted skills (e.g., Hosp, Hosp, & Howell, 2016; Howell & Hosp, 2014). Data collected from progress monitoring assessment can then be used to help tailor instruction to better meet an individual's needs. The current study used several progress monitoring measures to assess increases in the following reading skills: (a) morphological awareness; (b) reading fluency; and (c) reading comprehension.

**Morphological awareness.** The participant completed the morpheme identification task (i.e. *Affix Identification Task*) adapted from Apel, Brimo, Diehm, and Apel (2013) to measure growth in morphological awareness. In the morpheme identification task, the participant was presented with a list of 51 pseudowords. These pseudowords were composed of base words and affixes that create a nonsense word (e.g. *norther*). The participant was given 1 minute to circle

the affix in each pseudoword. The participant received one point for each affix that was correctly identified. The morpheme identification task has been shown to have a strong ( $\alpha = .92$ ) internal consistency reliability (Apel et al., 2013).

***Oral reading fluency.*** DIBELS Next Oral Reading Fluency (DORF) is a measure used to assess an individual's accuracy and fluency while reading in connected text; it also assesses advanced phonics and word attack skills (Good & Kaminsky, 2012). The participant was given 1 minute to read a passage based on his instructional reading level. While the participant read aloud, the examiner recorded any errors. Errors included substitutions, omissions, and hesitations of more than 3 seconds. The number of words the participant read correctly in 1 minute was the participant's oral reading fluency rate. The participant's accuracy was calculated by dividing the number of correct words by the number of correct words plus the number of errors and multiplying by 100. According to the technical manual, the passages for this measure were constructed to be grade appropriate (Good, Kaminski, Dewey, Wallin, Powell-Smith, & Latimer, 2013). Specifically, the passages were constructed to be of appropriate content, length, and flow, while using correct grammar, recognizing diversity, and including both known and unknown topics. In one validity study reported in the technical manual, alternate-form reliability for the DORF ranged from .95 to .98 for words read correctly, and .76 to .88. for accuracy. This indicates that words read correctly provides sufficiently reliable data to make important educational decisions. The reliability for accuracy is sufficient for screening decisions.

**Reading comprehension.** Reading comprehension was assessed using the DIBELS Next Daze maze procedures. The DIBELS Next Daze is a measure which uses reading passages to assess an individual's ability to comprehend text using word recognition skills, familiarity with linguistic properties, reasoning skills, background information, and prior knowledge (Good & Kaminsky, 2012). In Daze passages, the participant was given a passage based on his instructional reading level in which approximately every seventh word was replaced with a box. In this box are three choices: one correct choice and two distractors. The participant was given 3 minutes to read the passage silently and circle the word which best completed the sentence. The participant received 1 point for selecting the word which most accurately completed the sentence. Incorrect responses include items in which the participant selected more than one response and skipped items. Items that were not completed by the participant due to running out of time were not counted as incorrect. The participant's adjusted score was calculated by taking the number of correct words, subtracting half the number of incorrect responses, and rounding to the nearest whole number (if necessary). According to the technical manual, Daze passages were designed with the same specifications as passages from the DORF, with the exception that Daze passages are longer (Good et al., 2013). In one validity study in the technical manual, the alternate form reliability for Daze ranged from .74 to .95, indicating that the reliability for Daze was sufficient to make screening decisions.

**Pre/post curriculum-based measures.** Curriculum-based measures were used before and after the intervention to assess the improvements made as a result of the intervention. The three pre/post curriculum-based measures of morphology were adapted from Apel et al. (2013).

***Nonsense word analysis task.*** The nonsense word analysis task, (i.e. *Rehit task*) was designed to measure the participant's ability to combine two real morphemes into a nonsense word and derive meaning from this new word. This task took place in several steps. First, the examiner orally presented two morphemes to the participant and asked the participant to repeat the morphemes (i.e, "Say kick." [participant responds] "Now, say less." [participant responds]). Next, the examiner asked the participant to combine the morphemes into a nonsense word (i.e. "kickless"). One point was awarded if the participant accurately repeated and combined the morphemes. If the participant did not combine the morphemes correctly, then the examiner said the correct combination. Following this, the participant was asked to define the nonsense word. Responses were compared to definitions received from a survey of adults. The participant received two points for a correct response. If the participant's response was incorrect, the participant was asked to select the correct definition of the nonsense word from two options (e.g., "Do you think kickless means to be without a kick or to kick again?"). The participant received one point for choosing the correct definition. Lastly, the examiner presented two sentences containing the nonsense word to the participant and asked the participant to judge whether the sentences made sense using the newly defined nonsense word (e.g., "The girl bought a kickless"). The participant received one point for accurately responding to both sentences. In total, the participant could earn four points.

***Cloze sentence task.*** In the cloze sentence task (i.e. *Relatives Task*), the examiner provided a base word followed by a cloze sentence (e.g., "Walk. The boy \_\_\_\_\_ to school). The participant was then asked to orally complete the sentence, earning one point for a correct response. The cloze sentence task contained 26 items, with an additional two practice items that were administered before the test items.

**Affix spelling task.** The affix spelling task (i.e. *Spelling Multimorphemic Words task*) was designed to measure the participant's ability to produce multimorphemic words. In this task, the examiner said a multimorphemic word, used the word in a sentence, and repeated the word (e.g., Quickly. The girl ran quickly. Quickly). The participant was then asked to write the word. The spelling of the affix was scored, while the spelling of the base word was ignored. Correct responses received 1 point.

**Pre/post perception surveys.** The participant was asked to complete short surveys regarding his opinions on reading and the intervention using a 4 point Likert scale where 4 (*very positive/strongly agree*) to 1 (*very negative/strongly disagree*). The participant was asked to complete one survey before the intervention and one survey after the intervention. Questions regarding reading were adapted from McKenna and Stahl (2003).

## **Intervention**

**Design.** This study used a single-subject, multi-element design. This design is effective in evaluating academic interventions (Brown-Chidsey & Steege, 2010). Single-subject experimental designs take multiple measurements of a dependent variable both before the intervention (i.e. baseline) and throughout the intervention (i.e. formative assessment) (Brown-Chidsey & Steege, 2010). The effect of indirect instruction components (i.e. repeated reading with phrase drill error correction) and direct instruction components (i.e. morphology lessons) of the intervention were measured using curriculum-based measures (i.e. DORF probes, Daze probes, and affix identification probes).

Single-subject design methodologies utilize a single participant to observe the effects of an independent variable. Single-subject design methodologies protect against threats to internal validity through several steps. First, the initial or baseline level of the dependent variable is measured. After establishing a stable baseline, the independent variable (or intervention) is initiated. The dependent variable is then repeatedly measured throughout the introduction of the independent variable in a process called formative assessment.

Formative assessment monitors changes to the dependent variable after the introduction of the independent variable. This study made use of formative assessment on a weekly basis through progress monitoring assessments. In addition to formative assessment, this study used summative assessment.

Summative assessment is used to evaluate overall changes in the dependent variable before and after the introduction of the independent variable. Summative assessment was used in the form of pre- and post- curriculum-based measures. This study added another facet to the single-subject design in that it will also be multi-element. Single-subject multi-element designs utilize multiple independent variables to measure the effects on the dependent variable. This study utilized multiple elements by observing effects of the introduction of the intervention across multiple skills: (a) morphological awareness; (b) reading fluency; and (c) reading comprehension.

The design of the current study was based on a literature review from Bowers, Kirby, and Deacon (2010) that showed that instruction in morphology is (a) helpful to all learners, but especially helpful for people with learning disabilities, (b) equally effective for younger and older students, and (c) is more effective when incorporated with other reading instruction.

Furthermore, Reed (2008) found that morphology instruction could be combined with other reading instruction without require additional instruction time.

***Indirect instruction component of the intervention.*** Repeated reading with phrase drill error correction procedure (RRPD) is an effective means of increasing participants' fluency in reading (Joseph, 2014). RRPD consists of the participant reading aloud from an appropriate, grade-level passage while the interventionist records any incorrectly read words. The interventionist then models the phrase in which the misread word occurred and asks the participant to repeat the phrase three times. After repeating the phrases, the participant rereads the passage from the beginning. This process continues until the participant reads the passage with 90% accuracy.

***Explicit instruction component of the intervention.*** Explicit instruction consisted of lessons in morphology from the *Vocabulary Through Morphemes* (VTM) curriculum (Ebbers, 2011). According to the author, VTM was designed to foster the structural analysis of words, or *morphological awareness*. VTM has the following 4 major goals: (a) "promote student interest in and engagement with words," (b) "promote fluent reading of morphologically complex words," (c) "increase vocabulary knowledge," and (d) "students to confidently infer unknown word meanings during independent reading in any subject area" (Ebbers, 2011, p. 6).

## **Procedures**

After receiving IRB approval as well as parent consent and student assesnt, a pretest measure of the participant's abilities was given to assess changes as a result of the intervention. After these pretest measures, additional assessments were used to determine the participant's current abilities with the goal of providing the participant the appropriate level of instruction.

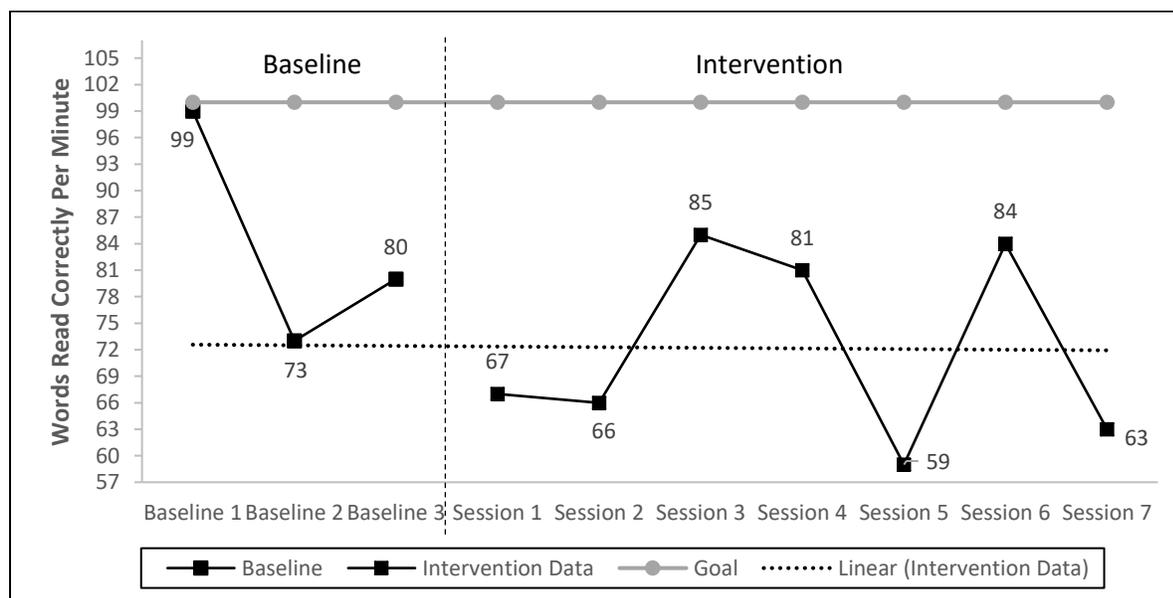
Following this, the the intervention began in the form of sessions lasting approximately 1 hour. Sessions consisted of RRPD (the indirect instruction component) and one lesson from the VTM curriculum (the direct instruction component). Additionally, sessions consisted of collecting progress monitoring data (i.e. formative assessment data). After the final instructional session, the participant was administered a post-test (i.e. summative assessment) to determine overall changes before and after the introduction of the intervention.

## CHAPTER III: RESULTS

### Hypothesis 1

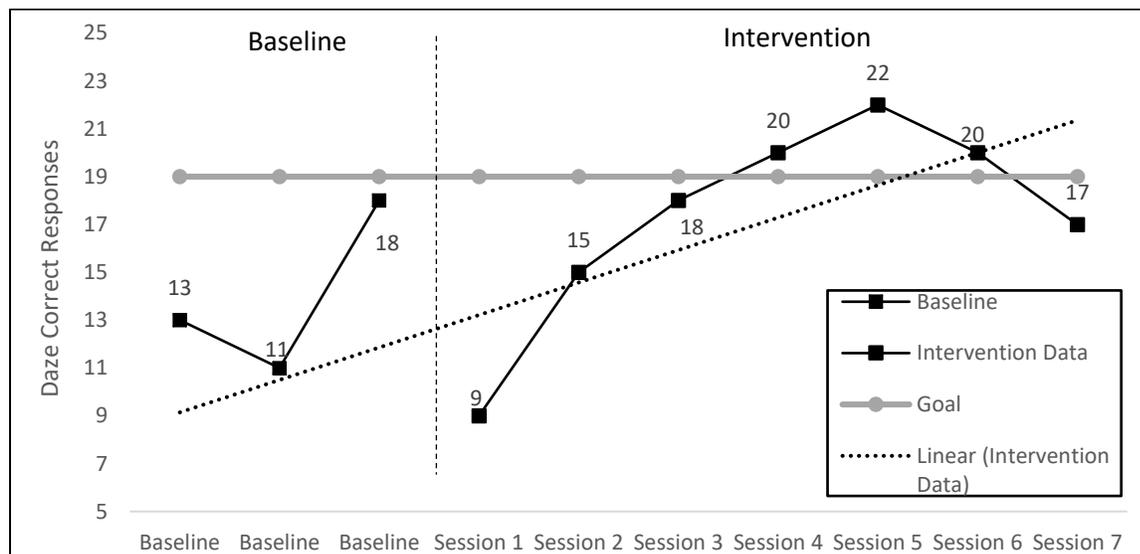
The first hypothesis posited that the participant would show improvements in oral reading fluency and reading comprehension as measured through DIBELS Next DORF and Daze and calculated using *g-index* and percentage of non-overlapping data (*PND*). As seen in Table 1, the participant showed high levels of variability in his progress monitoring data on DORF passages. While the *g-index* (0.33) was positive indicating the intervention was effective, the *PND* (0%) was poor. As noted by Hunley and McNamara (2010), *PND* can be affected by the fact that it ignores all baseline data except the most extreme data point in the desired direction. They further note that this point, due to its extremeness, may be unreliable. In the current case, the first baseline data point was only one wcpm (word correct per minute) below the goal line (100 wcpm); it was the highest score obtained throughout the entire intervention. Regarding the highly variable nature of the progress monitoring data, Daly and colleagues (2014) note that the number of words read correct per minute on oral reading fluency probes can be highly variable depending on the elements in an individual passage. Passages vary greatly in the number of (a) high frequency words, (b) unique or rare words, (c) multisyllabic words, and (d) irregular words (i.e., that don't fit regular phonetic patterns) they contain. These types of words have been shown to have a negative impact on poor readers rate on oral reading fluency tasks (Daly et al., 2014). Text difficulty level impacts one's ability generalize word reading skills across texts.

Table 1.

*Participant Progress on DORF*

As seen in Table 2, the participant did make improvements in reading comprehension as measured by DIBELS Next Daze subtest. He had a positive *g-index* (0.67) indicating that the intervention had an impact on his rate of improvement (ROI) during the intervention phase compared to his baseline performance. In fact, he had three data points that were above the goal line, although the final data point fell below the goal of 19 correct responses in 3 min. The *PND* (33%) was weak; however, as noted previously having a data point during baseline (18 correct responses per 3 min) that is only one point below the goal line has a negative impact on the calculation of *PND*.

Table 2.

*Participant Progress on Daze***Hypothesis 2**

The second hypothesis posited that the participant would show improvements in morphological awareness. As seen in Table 3, visual analysis of the graph indicates that the trend (ROI) for the data was in a positive direction. Specifically, the participant increased from 24 to as many as 44 affixes identified correctly per minute.

**Hypothesis 3**

The third hypothesis posited that the participant would report a positive perception of the intervention as measured by a post-intervention survey. As can be seen in Table 4, the participant generally had a negative perception of the intervention.

Table 3.

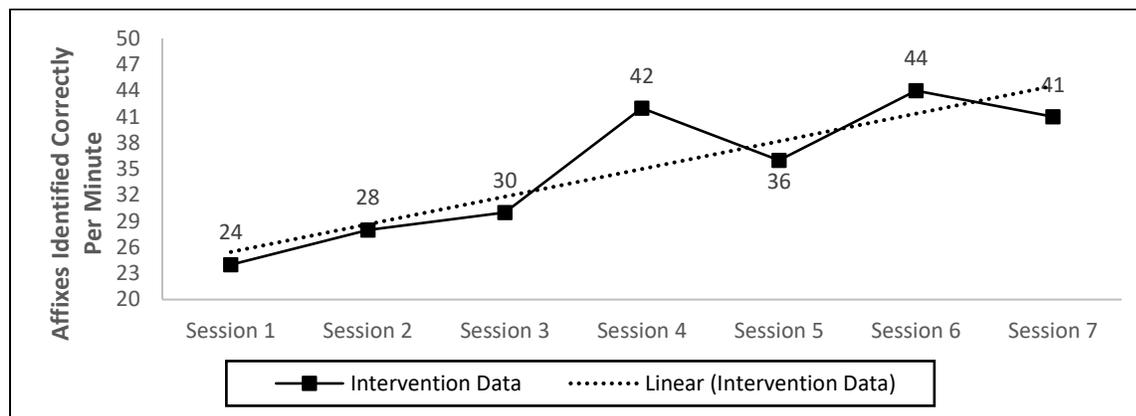
*Formative Assessment of Participant Morphological Awareness*

Table 4.

*Participant Perceptions of Intervention*

Items	Pre	Post
How do you feel if you get a book as a present?	1	1
How do you feel when someone asks you to read aloud?	1	1
How do you feel when you have to take a reading test?	2	1
I enjoy reading.	1	1
How do you feel about reading for fun?	1	1
How do you feel when you start reading a new book?	2	2
How do you feel when you read a book during summer vacation?	1	1
How do you feel when someone reads out loud to you?	2	2
How do you feel when we work on your reading skills?	--	2
How do you feel when it is time to come for reading intervention?	--	1

Note. 4 = very positive/ strongly agree; 1 = very negative/ strongly disagree.

#### Hypothesis 4

The fourth hypothesis posited that the participant would show improvements on pre/post intervention curriculum-based measures (i.e., Nonsense Word Analysis Task, Cloze Sentence Task, and Affix Spelling Task). This was the summative assessment for his growth in morphological awareness. The participant showed slightly higher performance on two of the three post-intervention morphological awareness summative curriculum-based measures compared to his performance before the intervention.

Table 5.

*Participant Results of Pre/Post Morphological Awareness Measures*

<i>Curriculum-Based Measure</i>	<i>Pre</i>	<i>Post</i>	<i>difference</i>
Nonsense Word Analysis Task	36	38	+2
Cloze Sentence Task	14	15	+1
Affix Spelling Task	10	10	0

## CHAPTER IV: DISCUSSION

Understanding the meaning of text is the final skill, and main objective, of reading. There are five main skills involved with reading: (a) phonemic awareness; (b) alphabetic principle; (c) fluency; (d) vocabulary; and (e) comprehension (e.g., Joseph, 2014, Joseph 2015; National Reading Panel, 2000). Reading comprehension is a complex process that that involves accurate word recognition, the ability to read fluently in connected text as well as the ability to activate prior knowledge, utilize text comprehension strategies, and to know the meanings of words. (e.g., Fletcher et al., 2007; Lyon, Fuchs, & Barns, 2019; Joseph, 2014; Joseph 2015). The extensive literature on reading suggests that effective methods for increasing reading vocabulary include using more than one procedure such as combining both indirect and explicit instruction (e.g., Edmonds et al, 2009; National Reading Panel, 2000).

Meanings of words are often developed intuitively through simply being exposed to words while reading, this is referred to as indirect instruction (National Reading Panel, 2000). As a result, indirect instruction through exposure to words in a variety of texts can lead to improvements in reading vocabulary (National Reading Panel, 2000). One example of indirect instruction is the use of repeated reading. Repeated reading increases the opportunity for students to be exposed to unknown words, while simultaneously increasing their exposure to known words (Joseph, 2014). Joseph (2014) also notes that research shows that repeated reading procedures are even more effective when combined with error correction procedures such as the phrase drill error correction procedure (RRPD).

One example of direct instruction that has been shown to be effective in improving reading vocabulary is instruction in morphological awareness (e.g., Goodwin & Ahn, 2010). Morphological awareness refers to an individual's ability to understand and employ the smallest units of meaning in language such as prefixes, suffixes, and base words. Gains in morphological awareness have been associated with gains in basic word reading, reading fluency, and reading comprehension (e.g., Bowers & Kirby, 2009; Bowers et al., 2010; Carlisle, 2010; Reed, 2008).

In the current study, an intervention was implemented that combined indirect instruction through RRPD with explicit instruction in morphological awareness. The participant showed a positive rate of improvement from baseline through the intervention on formative assessments of oral reading fluency (i.e., DIBELS Next DORF) and reading comprehension (i.e., DIBELS Next Daze) as indicated by positive *g-index* effect sizes. While it had been hypothesized that there also would be evidence of intervention effectiveness on *PND* effect sizes, this was not found. As noted previously, *PND* can be negatively impacted by an extreme score during baseline (e.g., Hunley & McNamara, 2010) which happened in the current study on both formative assessment from DIBELS Next. As hypothesized, the participant also showed improvements on formative measures of morphological awareness (i.e., affix identification task). Unlike what had been hypothesized there were only small increases in two of the three summative pre/post curriculum-based measures of morphological awareness. These skills are highly complex and there were a limited number of intervention sessions between pre/post test. Research has suggested that to see changes in complex skills as many as 20 weeks of intervention may be needed (Fletcher et al., 2019). Also, unlike what had been hypothesized, the participant reported negative perceptions the reading intervention. Fluent reading has been found to impact students' motivation and enjoyment of reading (Fletcher et al., 2019). The participant in the current study

was instructional (based on accuracy of reading in connected text) five grade levels below his current grade placement. This significant impairment in reading, especially in reading fluency, may be one reason why the participants reported a negative impression of the reading intervention. In fact, he had an overall negative perception of reading in general based on the pre/post perception measure.

### **Limitations**

One inherent limitation of the current study's methodology is associated with all studies utilizing a single-subject design. The single-subject design is prone to threats to internal validity. These threats include (a) history, (b) maturation, (c) testing, (d) instrumentation, (e) regression, and (f) mortality (Hixson et al., 2008). With the internal validity threat of history, changes in the participants performance may have been a result of events occurring outside of the study. With maturation, changes in the participant's performance may have been the result of the other reading interventions he was receiving from his special education teacher opposed to the current intervention. In testing, changes in a participant's performance have been the result of the measurement tools themselves being different (i.e. different reading passages) as opposed to changes in the participant's abilities. With regression, changes in the participant's performance may have been due to moving (i.e. regressing) towards the average student's performance as opposed to changes in the participant's abilities. In mortality, changes in the participant's performance may have been related to the intervention ending prematurely as opposed to changes within the participant.

Other limitation of the current study were related to the progress monitoring data that was collected. For example, the intervention's effectiveness may be limited to the small number of

data points collected. Additionally, it was difficult to ascertain the effectiveness of the intervention in the current study due to the high degree of variability in the data. Hixson, Christ, and Bruni (2014) suggest that 80% of the data should be within 20% of the median line. On the formative measure of oral reading fluency the variability was greater than this. Another potential limitation of the current study might have been a lack of consistency between the words being taught during the intervention and the words appearing on measures of oral reading fluency and comprehension. Although it is typical for multi-morphemic words to become more common as the grade level of the passage increases, it is possible that the selected passages were not aligned. Due to the student's persistent difficulties with reading throughout the intervention, he may benefit from an increase in the amount of time the intervention occurs.

### **Future Directions**

One potential future direction could be to assess the effectiveness of increasing the frequency of sessions per week as well as increasing the number of weeks in the intervention. The current study utilized the intervention for approximately 1 hour, twice a week. Future studies could increase this frequency to judge whether an increase in the *dosage* would lead to further student gains in oral reading fluency and comprehension. Another potential future direction could be around the analysis of collected data. Calculating a confidence band around the observed trendline may provide future studies with additional information. Finally, another future direction would be to increase the number of participants receiving the intervention. The generalizability of the intervention could be increased by including more participants of diverse ages and backgrounds.

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APPENDICES

## APPENDIX A: IRB APPROVAL

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



## IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Friday, March 15, 2019

Principal Investigator **Aimee Holt** (Faculty)  
 Faculty Advisor NONE  
 Co-Investigators Elliot Stock  
 Investigator Email(s) aimee.holt@mtsu.edu; estock@mtmail.mtsu.edu  
 Department Psychology

Protocol Title **Reading fluency and vocabulary training**  
 Protocol ID **19-2202**

Dear Investigator(s),

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

IRB Action	<b>APPROVED for ONE YEAR</b>	
Date of Expiration	<b>3/31/2020</b>	Date of Approval   3/15/19
Sample Size	10 (TEN)	
Participant Pool	Primary Classification: <b>Special Population - Minors (13-17 years old)</b> Specific Classification: <b>Students attending Franklin County schools</b>	
Exceptions	1. Combined Consent/assent is permitted 2. Contact information including identification number is permitted.	
Restrictions	1. <b>Mandatory signed parental consent and active child assent; the participants must have access to an official copy of the informed consent document signed by the PI.</b> 2. <b>Data must be deidentified once processed.</b> 3. <b>Identifiable data must be destroyed as described in the protocol.</b> 4. <b>Any identifiable data/artifacts that include audio/video data, photographs and handwriting samples must be used only for research purpose and must be destroyed after data processing.</b>	
Comments	NONE	

This protocol can be continued for up to THREE years (**3/31/2022**) by obtaining a continuation approval prior to **3/31/2020**. Refer to the following schedule to plan your annual project reports and be aware that you may not receive a separate reminder to complete your continuing reviews. Failure in obtaining an approval for continuation will automatically result in cancellation of this protocol. Moreover, the completion of this study **MUST** be notified to the Office of Compliance by filing a final report in order to close-out the protocol.

### Post-approval Actions

The investigator(s) indicated in this notification should read and abide by all of the post-approval conditions imposed with this approval. [Refer to the post-approval guidelines posted in the MTSU IRB's website.](#) Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident. Amendments to this protocol must be approved by the IRB. Inclusion of new researchers must also be approved by the Office of Compliance before they begin to work on the project.

#### Continuing Review (Follow the Schedule Below:)

Submit an annual report to request continuing review by the deadline indicated below and please be aware that **REMINDERS WILL NOT BE SENT.**

Reporting Period	Requisition Deadline	IRB Comments
First year report	12/31/2019	NOT COMPLETED
Second year report	12/31/2020	NOT COMPLETED
Final report	12/31/2021	NOT COMPLETED

#### Post-approval Protocol Amendments:

**Only two procedural amendment requests will be entertained per year.** In addition, the researchers can request amendments during continuing review. This amendment restriction does not apply to minor changes such as language usage and addition/removal of research personnel.

Date	Amendment(s)	IRB Comments
NONE	NONE.	NONE

#### Other Post-approval Actions:

Date	IRB Action(s)	IRB Comments
NONE	NONE.	NONE

**Mandatory Data Storage Requirement:** All of the research-related records, which include signed consent forms, investigator information and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study has been closed. Subsequent to closing the protocol, the researcher may destroy the data in a manner that maintains confidentiality and anonymity.

IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board  
Middle Tennessee State University

#### Quick Links:

[Click here](#) for a detailed list of the post-approval responsibilities.

More information on expedited procedures can be found [here](#).