

MORPHOLOGICAL WORD CHUNKING VS SYLLABLE TYPES:
UNDERSTANDING THE EFFECTIVENESS OF TWO APPROACHES TO
POLYSYLLABIC WORD READING INSTRUCTION FOR MIDDLE SCHOOL
STRUGGLING READERS

by

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ABSTRACT

Middle school is often the last place where students are taught basic reading skills such as phonology, morphology, fluency, and comprehension before they move on to high school where reading is predominately focused on understanding, analysis, application and evaluation of content area material. In addition, middle school students are exposed to texts with complex structure and an increasing number of multisyllabic words. RTI has attempted to close the gaps for struggling readers, with the goal of bring them closer to grade level.

This study focused on whether intensive multi-syllabic word interventions in middle school improve low-frequency word recognition skills and reading fluency. Two alternative word reading programs were examined for their effectiveness with middle school struggling students. One program was phonological based and focused on teaching syllable types while the other program was morphological based and focused on teaching word chunking strategies. The duration of each program was 4 weeks long in order to keep it in line with current interventions used in a RTI setting.

Despite a large amount of previous research confirming the merits of both phonological syllable type and morphological word chunking strategies, the results of this study were mixed, with none of the research questions being confirmed. However, effect sizes suggested interesting trends regarding the potential benefits of an intervention based on syllable types.

Implications for current approaches of middle school short intensive RTI tier programs are discussed. In particular, some middle school RTI research is showing a trend towards a longer RTI program with the goal of making struggling students more

proficient readers over the long term of a full school year or even several years instead of several short tier level movements within a single school year. Future research should not only focus on the best strategies for middle school students struggling with reading such as phonology and morphology, but moreover, how to best implement RTI over time to give these students the best possible future.

Keywords: phonology, morphology, word recognition, Response to Intervention (RTI), syllable type, word chunking

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LIST OF ABBREVIATIONS

CG	Control Group
DIBELS	Dynamic Indicators of Basic Early Literacy Skills
DMA	Decodable Multisyllabic Word Assessment
IRB	Institutional Review Board
MA	Morphological Awareness
MB	Morphologically Based
MAA	Morphological Awareness Assessment
NAEP	National Assessment of Educational Progress
NICHD	National Institute of Child Health and Human Development
NRP	National Reading Panel
PA	Phonological Awareness
PB	Phonologically Based
RTI	Response to Intervention
SES	Socio-Economic Status
SPED	Special Education
ST	Syllable Types
WA	Word Attack
WC	Word Chunking
WI	Word Identification
WRMT	Woodcock Reading Mastery Tests
WASI	Wechsler Abbreviated Scale of Intelligence

CHAPTER ONE

INTRODUCTION

Reading is a basic skill that is necessary for being successful in our current society (NICHD, 2000). Many stakeholders believe the results from the National Reading Panel's (NRP) Nation Report Card (NAEP, 2015) have shown limited improvement over the years. Only 36% of fourth grade students and 34% of eighth grade students read at or above grade level. The NRP study aimed to find the best practices for reading instruction to stem the rising tide of illiteracy in America, and their findings resulted in recommending six areas of focus for reading instruction: phonological awareness (PA), phonics, fluency, vocabulary, comprehension, and writing. Difficulties in any of these core areas will ultimately affect a child's reading ability, and in turn will result in reading frustration for many and reading failure for others.

By the time students enter middle school, it is assumed they know how to read, and it is thus expected they will read to learn from that point forward. But if a student has not mastered reading at grade level yet, how can they be expected to keep up the pace with their fluent peers in the classroom? Middle school may be the last opportunity to improve reading performance of struggling readers in small group settings, where basic skills are taught as needed. A program such as Response to Intervention (RTI) has been needed for many years to focus on struggling students. RTI was developed to screen out struggling readers, intervene with intensive, systematic reading curriculums, and give students a "safety net" to reduce the number of struggling readers (O'Conner, Briggs & Forbes, 2013, p. 95).

While RTI has now been implemented in elementary grades for many years, limited research is available on the effectiveness of RTI implementation in middle school (Faggella-Luby & Wardwell, 2011; Prewett et al., 2012). In spite of the fact that each state prescribes its own model of RTI, there are several similarities: most use a placement screener, evidence-based instructional practices, student progress monitoring, and assessment implementation and fidelity. Middle school RTI programs most often focus on intensive reading comprehension instruction (Hart & Stebick, 2016) and embed components suggested by the NRP into the program with the goal of improving overall comprehension. Yet we know students struggle in reading for differing reasons (Miciak et al., 2014). RTI programs could be more effective by targeting student's specific areas of weakness and not just overall comprehension, but they are often hindered by lack of teachers, insufficient teacher training, and sparse resources.

Effective reading intervention studies have largely focused on PA, the ability to identify and manipulate the individual sound units within words (Schuele & Boudreau, 2008). However, strong evidence supports a role of morphological awareness (MA) in reading comprehension, even after controlling for PA (Carlisle & Goodwin, 2013). MA corresponds to the ability to recognize, understand, and use the meaningful parts of words, and evidence suggests that the relationship between MA and reading comprehension may be particularly strong for individuals with poor multisyllabic word reading skills (Gilbert, Goodwin, Compton, & Kearns, 2011). While several MA intervention studies have found positive results when focusing on older students (Carlisle, 2010), research remains particularly scarce regarding MA intervention with struggling readers (Brimo, 2016; Elbro, 1990).

It should be noted that there is a clear difference between PA and phonics approaches to reading which are often used interchangeably. PA-based approaches focus on oral language, identifying and using units of speech including onset and rime, syllables, and words. Significant phonemic skills include segmenting into individual sounds and blending speech units together (Gillon, 2004). By contrast, phonics-based approaches focus on written language using phonemic awareness to perceive, recognize, then manipulate phonemes into spelling patterns. Significant skills include decoding of words into individual letter/sounds and encoding letters and patterns into words.

The ability to decode words is crucial for successful reading and incorporates three of the six elements suggested by the NRP: PA, fluency, and phonics. Decoding is a particularly successful strategy for learning new vocabulary during silent reading (Rosenthal & Ehri, 2011). Decoding requires readers to break words apart into understandable units, and then put them back together to comprehend their meaning. In the case of multisyllabic words, this process thus relies on MA as well. Still, there are primarily two alternative methods for teaching multisyllabic word decoding strategies: dividing words into syllables (a process also known as syllabification) based on the six syllable types (ST; Moats & Tolman, 2009), or chunking parts of word units into morphemes, which is a strategy known as word chunking (WC; Arnon & Christiansen, 2014).

ST approaches explicitly assign a classification for each type of syllable: closed syllable (e.g., *big*); open syllable (e.g., *no*); vowel + consonant + silent “e” syllable (e.g., *rake*); vowel pairs syllable (e.g., *boat*); r-controlled syllable (e.g., *car*); consonant + le syllable (e.g., *table*); and final stable syllable (e.g., *nation*). Multisyllabic words are thus

created from any combination of these types of syllable. The effectiveness of using ST-based intervention approaches with struggling readers has been documented in several studies (e.g., Bhattacharya, 2006; Bhattacharya & Ehri, 2004; Moats, 2004).

WC approaches use derivational morphology, which consists of adding affixes to a root word in order to create multisyllabic words. Affixes include prefixes, added before the root word (e.g., *unreal* and *explain*) as well as suffixes added to the end of the root word (e.g., *beaches* and *sweetest*). Often, more than one affix is attached to a base word (e.g., *mistaken* and *unsustainable*). Empirical evidence supports the effectiveness of WC-based interventions (e.g., Bowers, Kiby & Deacon, 2010; Goodwin & Ahn, 2010).

Purpose of the Study

While there is an abundant body of research on the effectiveness of ST and WC strategies, no study has yet directly compared these two types of interventions with struggling middle school readers. The current study thus focused on these competing instructional approaches used in middle school for multisyllabic word reading.

Middle school research is lacking on both PA and MA intervention approaches. Additionally, middle school may be the last place students can get word-level reading intervention. High school language arts programs focus on learning content knowledge through literary and informational text. While both PA and MA approaches are used in middle school, they are imbedded into the omnibus reading/language programs and are not isolated in order to determine their significance on word-level reading. Furthermore, word-level and fluency-level instruction often take a back seat to comprehension-level strategies.

Research Questions and Design

This study sought to answer the following five research questions:

- 1) After treatment, is there any difference among the three groups in decoding skill?
- 2) After treatment, is there any difference among the three groups in MA?
- 3) After treatment, is there any difference among the three groups in overall word reading?
- 4) After treatment, is there any difference among the three groups in multisyllabic word recognition?
- 5) After treatment, is there any difference among the three groups in reading fluency?

To this end, the present study included three groups of middle school struggling readers.

Two treatment groups received multisyllabic word reading intervention while the third “business as usual” group served as control. One of the two treatment groups (i.e., ST group) received traditional ST instruction while the other treatment group (i.e., WC group) received WC-based instruction. Participants’ reading abilities were assessed before the start of the intervention and at the end of the intervention period. Assessments focused on skills directly related to the two types of intervention (MA, phonemic decoding, word identification, multisyllabic word decoding) as well as oral reading fluency which is not explicitly taught.

Both the ST and WC intervention programs were developed by the researcher, based on the existing literature. Every attempt was made to provide direct, explicit, and systematic instruction. Efforts to maintain fidelity of treatment implementation included using two separate instructors (one to teach ST intervention sessions and the other to

teach the WC sessions), ensuring strict adherence to intervention format, having the researcher monitor and oversee all sessions, and using a fidelity check list and audio recording taken from at least 25% of the sessions.

Significance of the Study

How effective is RTI in delivering targeted, intensive, research-based interventions? RTI programs usually consist of a placement screener to determine if a student is in Tier 1 (i.e., general education classroom), Tier 2, which focuses on small group intervention, or Tier 3, with individualized intensive intervention. Evidence-based, explicit instructional practices are used in all tiers, student progress is monitored, and assessments are implemented with fidelity. This framework, however, is based on well-established elementary RTI programs and was adopted by middle schools without empirical data to ensure academic and behavior success for at-risk older students (Prewett et al., 2012). The proposed study examines an intervention that could be used within an RTI framework to address this gap in the literature.

In recent years, reading instruction has been moving away from ST strategies in elementary and middle schools for more all-inclusive reading remediation programs (e.g., Language!, Greene, 2009) where WC is taught almost exclusively. In fact, one study revealed teachers do not teach word structures because they do not know the word structures sufficiently (Spear-Swerling & Bruckner, 2003). The question thus remains whether reading interventionists using WC intervention strategies solely based on its newness and its ease of implementation without solid evidence-based research showing WC is a better intervention program for struggling middle school readers than the traditional ST strategies of the past. Both WC and ST interventions show improvements

over the current omnibus general and remedial education curriculum. However, the literature remains unclear how they stack up against each other. Middle school may be the last opportunity to reach out to and help struggling readers before they enter the substantial reading and rigorous high school program where the consequences are not as temporary as remediation in small groups or grade retention, and increased possibility of a permanent label of high school dropout.

CHAPTER TWO

LITERATURE REVIEW

The present review of the literature is divided into four main sections. The first section discusses the role of MA in the development of reading skills. Section two focuses on recent research exploring the profile of middle school struggling readers. Section three reviews the main intervention strategies currently used in the school systems to address the needs of these struggling students.

Morphological Awareness and Reading Skills

Morphology of English words. Morphology is the study of the structure of words and their smallest meaningful units called morphemes. English grammar includes free and bound morphemes. Free morphemes can stand alone, either as content words with a precise meaning (e.g., *dog, house*) or as function words that express structural relationships between content words in a sentence (e.g., articles, auxiliary verbs, conjunctions, pronouns, prepositions). They can also be combined with other free and/or bound morphemes to make up longer, multisyllabic words (e.g., *doghouse*), which are the focus of the present dissertation project. By contrast, bound morphemes appear only as part of a multisyllabic word. They can be either derivational or inflectional and take the form of prefixes - attached to the beginning of a word - or suffixes - attached to the end of a word. Derivational morphemes change the grammatical category and/or meaning of a word. For example, the morpheme *-er* is used to transform the verb *teach* into the noun *teacher*. Inflectional morphemes consist of short suffixes that act as grammatical markers (e.g., *s, 's, er, est, s, ed, ing, en*).

Link between morphological awareness and phonological awareness.

Phonological awareness (PA) corresponds to the ability to recognize and manipulate the individual sounds (i.e., phonemes) of spoken language. PA has long been recognized as one of the foundations of reading acquisition (e.g. Goswami & Bryant, 1990). However, English orthography is relatively opaque, meaning that a single phoneme can represent different letters (e.g., the sound [s] can be spelled *c*, *ce*, *s*, *sc*, *se*, *ss*, or *ps*) while the same letter may be pronounced differently depending on the context (e.g., the sequence *gh* is pronounced [g] in *ghost* or [f] in *cough*, but is silent in *high*). This variability in letter-sound correspondence reflects the morphophonological nature of English orthography, and partially results from the way morphemes influence each other's pronunciation when they combine (Apel, & Werfel, 2014). For instance, a root word can change the pronunciation of a bound morpheme, such as the inflectional morpheme *s* pronounced [s] in *cats* but [z] in *dogs*. Similarly, a bound morpheme can modify the pronunciation of the root word. This is the case, for example, of the suffix *-ic*, which produces a change in lexical stress (e.g., '*acid* vs. *a'cidic*), as well as the suffix *-ation*, which changes the pronunciation of the *t* in the root word from [t] (e.g., *activate*) to [ʃ] (e.g., *activation*).

Adding a morpheme may also lead to a change in the word phonological structure in order to prevent a violation of the language phonotactic rules, which are the constraints that define the permissible combinations of phonemes within a word (Bailey & Hahn, 2001). For instance, in the present tense, creating the third person form of the verb *wish* [wɪʃ] by simply adding the suffix *-s* would lead to the form [wɪʃs], in which the phoneme combination [ʃs] is not permitted in English. To prevent this potential conflict, a vowel is

thus inserted between the root word and the third person marker to produce the correct form [wɪfɪz].

Given these tight interactions between phonological and morphological properties of English words, it is not surprising that research shows a significant correlation between MA and PA in young readers (e.g., Stahl & Negy, 2006). However, as discussed in more detail in the next section, there is also evidence that MA makes unique contribution to reading skills, even after controlling for PA (Carlisle & Goodwin, 2013).

Morphological awareness and reading acquisition. Where does MA stand in current models of reading? One of the most influential models is the Simple View of Reading (SVR), which posits that reading comprehension is the product of word recognition by language comprehension (Gough & Tunmer, 1986). Word recognition involves PA, decoding and sight word recognition, while language comprehension involves vocabulary, background knowledge, language structure, verbal reasoning and literacy knowledge (Scarborough, 2001). The SVR does not directly address the role of MA in reading. However, a confluence of recent data suggests that MA is a strong predictor of students' reading comprehension in a range of grades. For instance, in a longitudinal study from second to fifth grades, Deacon and Kirby (2004) showed that MA predicted pseudoword reading and reading comprehension skills, even after controlling for IQ and PA. Complementary evidence shows that MA becomes a stronger predictor of reading ability than PA by fifth grade (Carlisle & Stone, 2005; Tong et al., 2011).

In middle school, morphology increasingly takes the form of multisyllabic words containing affixes. In fact, starting in third grade, students are exposed to 4,000-10,000 new words per year, many being multisyllabic (Nagy & Anderson, 1984), and

morphemes may be strategically manipulated by students to support their word learning (Goodwin, 2016). MA strategies and tools are thus a must for reading success in middle school. Research shows that effective MA classroom instruction includes teaching highly utilized academic word meanings, scaffolding word manipulation in instructional context, training on roots and affixes, as well as providing meaningful context for students to practice MA skills (Kieffer & Lesaux, 2012). Still, there is no unified MA instructional approach (Goodwin, 2016). Some approaches focus on words in isolation while others teach MA as a tool conveying problem-solving principles for more complex unknown words (Nagy & Townsend, 2012). One of the approaches that has been shown to be the most effective for developing these MA tools in adolescents is explicit instruction for breaking words apart, using morphemes to build words as well as meanings of roots and affixes, both of which students can use to build the needed skills for supporting complex academic reading (Goodwin & Ahn, 2010).

Characteristics of the Middle School Struggling Reader

When students lack basic reading skills, they often have difficulties analyzing linguistic units and understanding meanings (Larsen & Nippold, 2007), leading to the need for intervention. When identified early using appropriate screening tools, struggling readers can often overcome weaknesses in decoding, comprehension, and fluency (Ritchey, Silverman, Schatschneider, & Speece, 2015). Unfortunately, reading deficits are not always identified early, and sometimes weaknesses do not become evident until the middle school years. As a result, middle school teachers must deal with struggling readers displaying a wide variety of profiles in the classroom. In order to identify the reading characteristics of middle school struggling readers, a search of the literature was

conducted using the following terms, both independently and using Boolean terms (“and,” “not,” “or”): “middle school,” “struggling reader,” “reading disability,” “word-level,” “fluency,” “comprehension,” “early-emerging,” and “late-emerging”. A total of twenty studies emerged from online search engines that included EBSCO, ERIC, and Google Scholar (see Appendix A). The results of these studies were then grouped into identifiable categories to establish a reader profile. These categories included level of reading ability, onset of reading problems, areas of reading weakness, and type of multisyllabic word deficit.

Level of reading ability. Identification of reading disability is often sporadic, and students do not always get identified as having a learning disability. This is often the case with students in RTI program. Generally, students fall into one of four categories: typically developing reader (TD), struggling reader without identification (SR), reading/learning disability (RD/LD) identified through a battery of assessments, and intellectual disability (ID) most commonly identified as having an IQ score well below the norm.

Onset of reading problems. Middle school students with reading problems are generally identified early in grades K- 3, but some students do not show any sign of impairment until fourth grade or later, when they must begin the process of reading to learn from informational text. The former is often termed early-emerging reading disability (EERD) while the latter is termed late-emerging reading disability (LERD). Students with either EERD or LERD often suffer from similar difficulties in vocabulary, PA, nonword decoding, and orthographic knowledge (Kearns et al., 2016). However, students with EERD have cognitive deficits not seen in LERD, and that are often

identifiable in reading performance when making complex connections between orthography and phonology in unfamiliar words (Steady et al., 2017). In addition, both EERD and LERD may continue to have problems with word reading and spelling into middle and high school years. While students with LERD often appear to read proficiently in the early grades (Leach, Rescorla, & Scarborough, 2003), reading difficulties may develop after the third grade because of increasing demands for text reading and changes in reading assessment approaches (Catts et al., 2012). Alternatively, some research suggests that LERD may be the result of impaired orthographic representations in early grades (Galletly et al., 2009). Less specific cognitive deficits, such as a weakness in working memory, have also been found to be predictive of LERD (e.g., Etmanski, Partanen, & Siegel, 2016).

Areas of reading weakness. Regarding reading weaknesses, three specific areas were considered: word-level reading where students have difficulties in pronunciation, decoding unknown words, and do not understand the meaning of words; reading fluency where students have slow speed, inaccuracies, and little to no expression in reading; and comprehension where students are reading passages, but have little knowledge of the subject matter. Overall, studies show that most middle school students with reading difficulties have poor decoding, vocabulary, fluency, and/or comprehension (Hock et al., 2009; Miciak et al., 2014). Struggling readers may have weaknesses in more than one reading component and often needs are not met by predetermined instructional reading programs (Buly & Valencia, 2002). Middle school struggling readers need diverse and intensive instruction in fluency, vocabulary, and comprehension (Dennis, 2013). Some SR students are deficient in one area while others have deficiencies in several of them,

with only a small number exclusively needing comprehension interventions (Cirno et al., 2013). Some students in seventh and eighth grade continue to suffer from difficulties with phonics and word attack skills (Nelson, Alexander, & Sudweeks, 2014). In addition, oral reading fluency issues can often be used to identify SR students using stringent cut points in the reading screenings (Denton et al., 2011). Students with poor comprehension have deficits in general language comprehension and can show mild deficits in semantic and syntactic processing at early stages of reading (Catts, Adlof, & Weismer, 2006). However, in early grades, it may be hard to distinguish between students with poor comprehension, students with poor decoding, and student with a combination of both (Catts et al., 2006).

Type of multisyllabic word deficit. Directly related to the current study, word-level reading studies particularly focused on examining whether difficulties observed in middle school students, who are generally reading multisyllabic words and comprehending information text in the content areas, stem from a phonologically-based or meaning-based deficit (See Appendix A). Students with phonologically-based (PB) weaknesses have problems with PA, spelling patterns, and phonics (Bhat et al., 2003; Catts et al., 2006; Cirno et al., 2013; Dennis, 2013; Etmanski et al., 2016; Hock et al., 2009; Galletly et al., 2009; Kearns et al., 2016; Miciak et al., 2014; Nagy et al., 2006; Nelson et al., 2014; Ritchey et al., 2015; Roman et al., 2009; Steacy et al., 2017), while students with meaning-based (MB) weaknesses have problems with MA, orthography, and vocabulary (Cirno et al., 2013; Dennis, 2012; Kearns et al., 2016; Larsen & Nippold, 2007; Nagy et al., 2006; Roman et al., 2009; Steacy et al., 2017). While MA makes a significant contribution to decoding along with other reading skills in the early grades, its

contribution becomes particularly strong by eight and ninth grades (Nagy, Berninger & Abbot, 2006). Students with a higher level of MA have greater accuracy and fluency, resulting in better comprehension (Nagy, Berninger & Abbot, 2006). Students who continue displaying reading difficulties into middle school often have noticeable phonological deficits (Bhat, Griffin & Sindelar, 2003). However, some struggling older readers are deficient in MA and orthographic knowledge in addition to PA, fluency, and comprehension (Roman et al., 2009). Thus, older struggling readers with weaknesses in word decoding and reading connected text benefit from interventions focused on both word analysis skills and reading comprehension (Denton et al., 2011).

Interim summary. Middle school struggling readers have difficulties in several areas, including PA, MA, orthographical knowledge, and comprehension. Appropriate, in-depth screenings not only in early grades (K and 1st) for PA, but also in early middle school grades for both PA and MA, are thus of vital importance to initiate help for these students. The literature reviewed in this section suggests that early screenings should focus on a full battery of reading components stressing PA, word-level skills, fluency, cognitive deficits, working memory, and orthographic representations. These last two components could make it especially possible to identify LERD in later grades. Middle school screenings should emphasize the above grade-appropriate components with an extra emphasis on MA, and content matter comprehension.

Reading Intervention for Struggling Middle School Readers

Proper identification of strengths and weakness is key to finding targeted interventions based on student needs and not a predetermined instruction, one-size-fits-all, program. But this point leads to another question: what are the most effective

interventions for middle school struggling readers? A comprehensive search of the literature was conducted to investigate the effectiveness of current middle school reading intervention programs. The following terms, both independently and using Boolean terms (“and,” “not,” “or”), were included: “reading interventions,” “middle school,” “struggling reader,” “reading disability,” “word-level,” “fluency,” “comprehension,” “early-emerging,” and “late-emerging.” Utilizing online search engines including EBSCO, ERIC, and Google Scholar, eighteen studies were identified (see Appendix B).

The results of each study in review were categorized into identifiable groupings. Those groupings included intervention effects on student categories (TD - Typically Developing Reader, SR - Struggling Readers, RD - Identified as Reading/Learning Disability, ID – Intellectually Disability), target of reading interventions (word-level, fluency-level, and comprehension-level), and focus of intervention at the word-level (Phonetically-based and Morphologically-based). It should be noted that no interventions were found specifically targeting EERD or LERD readers.

Effect of interventions on student categories. What has the effect of intervention been on student categories? The first category is the TD student at or near grade level. Next was the struggling readers not identified with RD. The RD/LD category contained studies of students specifically identified as RD and LD. Finally, the fourth group was for studies addressing ID where students were identified with ID because of low IQ scores and other factors, however, no studies were selected for inclusion if the interventions addressed ID only.

Two studies were found to address interventions for TD only (Barth et al., 2016; Bauman et al., 2003) with two additional studies addressing TD and SR (Barth &

Elleman, 2017; Goodwin, 2016). The studies that determined effective interventions for TD included text-processing comprehension interventions (Barth et al., 2016), morphological instruction within comprehension strategies (Goodwin, 2016), and multi-strategy inference intervention (Barth & Elleman, 2017). Morphologic interventions in Social Studies classes showed mixed results, as the treatment group showed improvement at inferring the meaning of new affixed words as well as morphologically and contextually decipherable words, but only after a long intervention period. Additionally, the morphological group showed no difference in social studies content and reading comprehension measures (Bauman et al., 2003).

Three studies were found to target SR only (Berkeley et al., 2012; Bhattacharya & Ehri, 2004; Wagner & Espin, 2015) and two others focused on SR and RD (Diliberto, Beattie, Flowers & Algozzine, 2009; Spencer & Manis, 2010). The studies determined effective interventions for TD include the multi-component reading program (Wagner & Espin, 2015), Graphosyllabic interventions (Bhattacharya & Ehri, 2004), the Syllable Instruction Curriculum with direct, explicit, systematic syllable skills instruction (Diliberto, Beattie, Flowers & Algozzine, 2009), and Great Leaps fluency program with clear performance criteria, systematic progression, implementation by adults, and incorporation of regular error correction and feedback (Spencer & Manis, 2010). Corrective Reading Program had mixed results with no initial improvement, but over the course of the school year, decoding and oral reading fluency was improved (Berkeley et al., 2012). No gains were seen with whole-word instruction (Bhattacharya & Ehri, 2004), and Great Leaps showed no improvement in comprehension (Spencer & Manis, 2010).

Seven studies looked at interventions for RD students only (Bhat, Griffin & Sindelar, 2003; Calhoon, Sandow & Hunter, 2010; Frijter et al., 2013; Tressoldi, Vio & Iozzino, 2007), and two studies were found addressing both RD and ID (Brown, Lignugaris-Kraft & Forbush, 2016; Meyer, 1982; Wanzek et al., 2003). Successful interventions for RD students include Great Leaps program PA segment (Bhat, Griffin & Sindelar, 2003), PHAST Reading program (Frijter et al., 2013), RAMP-UP when literacy skills are paced (Calhoon, Sandow & Hunter, 2010), automatization of syllable recognition training for students with dyslexia (Tressoldi, Vio & Iozzino, 2007), and multimodule explicit vocabulary and comprehension strategies (Wanzek et al., 2003). It should be noted, Great Leaps program produced no significant improvement in word identification (Bhat, Griffin & Sindelar, 2003).

Targets of reading interventions. There are three levels of reading which this review focuses on: word-level, fluency level, and comprehension level. Four studies target all three levels (Calhoon, Sandow & Hunter, 2010; Frijter et al., 2013; Wagner & Espin, 2015; Wanzek et al., 2003). These comprehensive interventions addressed multiple components in each stage of the reading process. Two were studies which used commercial reading programs, PHAST (Frijter et al., 2013) and RAMP-UP (Calhoon, Sandow & Hunter, 2010) while the other two utilized a multi-component researcher produced reading program (Wagner & Espin, 2015; Wanzek et al., 2003). The results of the commercial programs had mixed results on various components. The researcher produced interventions fared somewhat better. From these studies, the following descriptions were derived: word-level interventions focus on reading and meaning of individual words only; fluency-level focuses on reading of meaning of short phrases and

sentences including text accuracy, speed, and expression; and comprehension-level includes recall of facts, extensions, and predictions.

Word-level interventions. Solid gains in decoding were the most prevalent area of achievement (Berkeley et al., 2012; Bhattacharya & Ehri, 2004; Diliberto, Beattie, Flowers & Algozzine, 2009; Steacy et al., 2016), however, the types of interventions ranged in implementation such as syllable analysis group instruction (Bhattacharya & Ehri, 2004), patterns of syllables, steps needed for syllabication, and patterns of accentuation (Diliberto, Beattie, Flowers & Algozzine, 2009), and automatic syllable exercises (Tressoldi, Vio & Iozzino, 2007). Additional increases were observed in vocabulary and inference (Bauman et al., 2003) as well as automatization of rapid orthographic units (Tressoldi, Vio & Iozzino, 2007).

Other reading components had less success of improving reading ability. Results were mixed on the effect of decoding on comprehension (Diliberto, Beattie, Flowers & Algozzine, 2009; Spencer & Manis, 2010). Whole-word instruction yielded no gains (Bhattacharya & Ehri, 2004).

Fluency-level interventions. Six studies addressed fluency and its impact on reading improvement (Berkeley et al., 2012; Calhoon, Sandow & Hunter, 2010; Spencer & Manis, 2010; Sukhram & Monda-Amaya, 2017; Wagner & Espin, 2015; Wanzek et al., 2003). While these studies resulted in overall improvement in fluency, multi-component interventions focusing on word-oriented, fluency-oriented, and comprehension-oriented showed significant improvement on transfer passages (Wagner & Espin, 2015) and single-word identification, nonword decoding, and even passage comprehension (Frijter et al., 2013). Moreover, systematically organizing the delivery of reading components

provides a strong base for later improvements in both fluency and comprehension (Calhoun, Sandow, & Hunter, 2010). Where clear performance criteria, systematic progression from easier to harder tasks, implementation by adults, and incorporation regular error correction and feedback are present, greater gains are achieved (Spencer & Manis, 2010). Students are less likely to maximize achievement when fidelity is lacking (Berkeley et al., 2012).

Comprehension interventions. A majority of the studies showed improvements in comprehension (Barth & Elleman, 2017; Brown, Lignugaris-Kraft & Forbush, 2016; Calhoun, Sandow & Hunter, 2010; Frijter et al., 2013; Goodwin, 2016; Spencer & Manis, 2010; Sukhram & Monda-Amaya, 2017). Mixed results in comprehension were found in one study (Wanzek et al., 2003) while no gains in comprehension were seen using the multi-component Great Leaps program which focuses on fluency activities, letter/sound correspondence, individual words, word sorts, sight phrases, and context. (Spencer & Manis, 2010). It should be noted, though, that this latter study did not include any explicit comprehension strategy instruction.

Focus of Interventions. This study focused on two types of word-level interventions: Phonetically-based and Morphologically-based.

Phonetically-based interventions. Ten studies were found addressing phonetically-based interventions (Berkeley et al., 2012; Bhattacharya & Ehri, 2004; Calhoun, Sandow & Hunter, 2010; Diliberto, Beattie, Flowers & Algozzine, 2009; Frijter et al., 2013; Griffin & Sindelar, 2003; Meyer, 1982; Stacy et al., 2016; Tressoldi, Vio & Iozzino, 2007; Wanzek et al., 2003). A majority of these studies demonstrated increases in decoding skills after intervention (Berkeley et al., 2012; Bhattacharya & Ehri, 2004;

Calhoun, Sandow & Hunter, 2010; Diliberto, Beattie, Flowers & Algozzine, 2009; Frijter et al., 2013; Stacy et al., 2016; Wanzek et al., 2003). Direct, explicit, and systematic syllable skills instruction is effective for struggling readers, and decoding skill can increase comprehension (Diliberto, Beattie, Flowers & Algozzine, 2009). Word-level phonological interventions provided gains in PA (Bhat, Griffin & Sindelar, 2003), syllable patterns (Diliberto, Beattie, Flowers & Algozzine, 2009), automatization (Tressoldi, Ivo & Iozzino, 2007), and spelling (Bhattacharya & Ehri, 2004; Calhoun, Sandow & Hunter, 2010).

Morphologically-based interventions. Three studies addressed morphologically-based interventions (Bauman et al., 2003; Goodwin, 2016; Brown, Lignugaris-Kraft & Forbush, 2016). While all three studies showed improvements in MA, vocabulary, and word reading after morphological instruction, two studies displayed gains in transfer to related words (Bauman et al., 2003; Goodwin, 2016). The study of prefixes can show results in increased reading comprehension (Brown, Lignugaris-Kraft & Forbush, 2016). Finally, evidence was found for an increase in morphologically related word generation, or the ability to create new words from known words by adding affixes. Extra time on MA instruction where students used prefixes and sentence context instruction to derive new words in a sentence, did not impact general reading skills due to lack of time spent on other reading components such as spelling, and comprehension.

Interim summary. The morphophonemic nature of English orthography highlights the need for teaching both PA and MA skills. Reading instruction usually focuses on PA in the early grades and move to MA by third grade. With struggling readers, the earlier they are identified, the better the chance for bringing them up to peer

levels; yet, reading deficits often do not manifest until middle school years (Kearns et al., 2016). These deficits are evident in PA, MA, orthographical knowledge, and comprehension. Current research evidence suggests that effective interventions for struggling middle school students should employ a multi-component reading program approach (Wagner & Espin, 2015; Wanzek et al., 2003). Because the needs of middle school struggling readers are different, essential decoding skills taught in interventions should include grapheme-phoneme correspondence, PA and MA training, paced literacy skills, automatization of syllable recognition, vocabulary, word origins, and comprehension strategies. Implementation is also vital for achievement and should include explicit and systematic instruction with clear performance criteria, organized progression, and they should be taught by knowledgeable professionals who give regular error correction and feedback to students (Spencer & Manis, 2010). With research pointing to the need for reading interventions for struggling middle grades students, PA and MA instruction in middle school may be one viable avenue for improving reading. Examining the impact of one approach over another and to design interventions to address both these areas of weakness found in so many middle schoolers would be useful for researchers and educators.

CHAPTER THREE

METHODS

Participants

The study started with 27 students (mean age = 12.88; SD = 1.40; min = 11.25; max = 14.58) who were in the RTI program for the 2017-2018 school year at a predominantly suburban middle school in the middle Tennessee region (See Table 1 for descriptive statistics). The selected school has over 1,000 students from a diverse population (69% white, 15% African-American, 7% Hispanic, 5% Asian, and 4% of two or more ethnicities) and socio-economic status (SES) including older rural areas, suburban and growth areas, and urban city. About 33% of students are from low income homes, and 9% of students have disabilities. Due to district zoning, the school, while located in a rural part of the county, serves a number of students from the larger city to the north. The teacher-student ratio is 1-15.

School interventions are determined by the Tier level or special education resource services. In Tier level 1, students received 55 minutes of language arts instruction in the general education classroom and additionally had a 55-minute writing class. In Tier level 2, students not only received general education language arts instruction, but also an additional 20-minutes Reading Focus class intervention with a trained reading specialist. Some Tier 2 students continued to receive the general education writing class, while others did not due to scheduling conflicts. In Tier 3, students continued to receive language arts instruction in the general education classroom with the addition of a 55-minute reading intervention class. These students did not receive the general education writing class. Finally, the special education resource

students received a 55-minute Reading Focus class with a trained special education teacher in addition to the general education language arts instruction, but they did not receive the writing class.

At the beginning of the 2018-2019 school year, parents were sent a letter offering a free multisyllabic word intervention program for their child during the first 6-weeks of school (see Appendix C). After IRB approval, parental and student consent was obtained for approximately thirty participants. Students were then screened for non-verbal general intelligence and completed an interest survey. Participants were randomly assigned to one of three groups: the phonemic decoding syllable types (ST) treatment group, the morphological word chunking (WC) treatment group, and the “business-as-usual” control group (CG). All participants received the general education language arts curriculum and RTI remediation during the school day. Two students dropped out of the intervention, one from the ST group and the other from the WC group, because they were no longer able to be picked up after school.

Non-verbal general intelligence was screened using the Wechsler Abbreviated Scale of Intelligence - Second Edition (WASI-II). The WASI-II consists of four subtests: Vocabulary, Block Design, Similarities, and Matrix Reasoning. Only the composite score derived from the age-adjusted standardized scores on the Block Design and Matrix Reasoning subtests were utilized to yield a non-verbal IQ score. The WASI test-retest reliability coefficients of the subtests ranged from 0.87 to 0.92. Inter-scorer agreement was high (> 0.90) for all subtests. The IQ scores were used to provide descriptive information regarding the participants.

Participants also completed a Student Interest Survey designed by the researcher (See Appendix D) to collect background information as well as identify topics for discussion, areas of interest, and potential rewards.

All students were present at each session unless they were absent from school that day. Each of the two intervention groups had a total of 9 students, which was somewhat larger than a regular Tier level 3 class. Students that were absent were given instruction by the primary researcher outside of intervention time.

Instrumentation

The four following measures were administered before and after the intervention period. The total administration time was approximately 60 minutes.

Woodcock Reading Mastery Tests, Third Edition (WRMT-III). The WRMT-III is a standardized, norm-reference test used for progress monitoring. Only the Word Attack (WA) and Word Identification (WI) subtests were administered. The WA subtest asked students to read words of increasing difficulty, whereas the WI subtest asked students to read nonsense words increasing in difficulty. The administration of both subtests is approximately 10 minutes. The reliability rating included Tests Median of .91, Clusters Median of .95, and a Total Median of .97.

Dynamic Indicators of Basic Early Literacy Skills, Six Edition (DIBELS 6th Edition). DIBELS 6th Edition was a standardized set of brief reading passages designed to assess early literacy skills between Kindergarten and 6th grade and intended to give local normative comparisons. DIBELS assesses phonemic awareness, alphabetic principle, accuracy and fluency, vocabulary, and comprehension. In the present study, the DIBELS was used to assess participants' oral reading fluency (i.e., the ability to read

accurately, quickly, and with appropriate expression). On the Oral Fluency test, students are given a passage to read orally for one-minute. The examiner marks any word read incorrectly and notes where the student stands after one minute. Reliability indicators for 6th grade are .93 for single probe and .98 for multiple probe (Dynamic Measurement Group, 2008). Administration of the DIBELS Oral Fluency takes approximately 3 minutes.

Decodable Multisyllabic Word Assessment (DMA). It was expected that weaker readers would likely do poorly on the WRMT Word Identification subtest, and thus unlikely reach the multisyllabic items on this test. Therefore, the researcher developed the DMA to specifically target decoding skills which would not be readily recognized using only the WRMT. The DMA is a researcher-created assessment based on the multisyllabic word reading task developed by Gilbert (2011). The multisyllabic words were derived from Gilbert (2014), which included two lists of 30 words taken from Carlisle and Katz's (2006), Reading Complex Word Measure. The selected words were controlled for frequency and transparency (see Appendix E for a complete list of words used on the DMA). Participants read 32 words composed of three or more syllables explicitly taught during the intervention. The administration time for the DMA was approximately 15 minutes. The DMA scoring procedure consisted of 32 multisyllabic words of three-five syllables. Students receive 0 to 3 points per word broken down as follows: 0 points if the student did not know the word, 1 point for a portion of the word correct, 2 points for decoding of the word, and 3 points for automaticity of the word. The ceiling had a score of 96. Internal consistency of the DMA was measured for the sample of the present study with Cronbach alpha (Form A =.92, Form B .88).

Morphological Awareness Assessment (MAA). The MAA was a researcher created measure adapted from two previous MA assessments, namely, Carlisle (2000) Test of Morphological Awareness and McCutcheon and Logan (2011) Morphological Nonword Analysis Task. Carlisle used decomposition and derivation tasks for older students. In one part, they were given a word and asked to add an affix to it to complete a sentence. In the second part, students were given a word and asked to remove the affix from it to complete a sentence. McCutcheon and Logan used morphologically related nonwords in a sentence and asked students to replace the underlined word with the best meaning. Based on these two measures, the MAA consisted of two parts with Part 1 having 10 common prefixes, 10 common suffixes and 10 common Greek and Latin affixes where students were asked to select the best meaning for the word. Part 2 consisted of 10 prefixes and 10 suffixes where students were asked to add the affix to complete the sentence. Students selected the best meaning from a list of words containing 30 affixes and stems. Additionally, students formed new words by adding affixes to 20 base words (See Appendix F for a list of items used on the MAA). The administration time for the MAA was approximately 15 minutes. The scoring procedure for the MAA gave 1 point for each correct question. Part 1 consisted of 30 points, and part 2 consisted of 20 points for a total of 50 possible points. Internal consistency of the MAA was measured for the sample of the present study with Cronbach alpha (Form A =.90; Form B .80).

Intervention Procedure

Participants who met the screening criteria were randomly assigned to one of three groups: the ST treatment group, the WC treatment group, and the CG. The CG

group was not required to stay after school during the intervention sessions. However, they were offered an opportunity to participate in the intervention when the final assessments were completed.

The interventions were administered by two certified and experienced classroom teachers. One teacher was trained on the ST intervention and taught the ST sessions only, while a second teacher was trained on the WC intervention and taught the WC sessions only. The researcher conducted the training for both types of intervention. Having separate instructors for each type of intervention allowed minimum-to-no intermixing of the two types of intervention during instruction. All care was taken to minimize teacher effect issues through researcher preplanning, using similar materials, and careful monitoring of each class.

Research has noted fidelity in implementation is of vital importance in the success of any intervention (Diliberto, Beattie, Flowers & Algozzine, 2009; Spencer & Manis, 2010). To insure fidelity in the implementation of the interventions, the researcher supervised all instruction. Fidelity checks were conducted daily by the researcher to include ensuring the teacher of each intervention had their intervention bin and was following the PowerPoint, the students were engaged, and assigned work was being completed.

Common Lesson Structure. Each day, before the intervention began, the teachers picked up their intervention bin, which included the word sorts, worksheets, posters, and other manipulatives that were needed for the daily lesson. Each lesson was scripted according to the lesson plan and the intervention teachers followed the researcher-created daily PowerPoint slide show and activities (see Appendix G for an

example of the ST PowerPoint and Appendix H for the WC Group PowerPoint). Each lesson was set up as follows: opening activity or video for both groups centered on difficult words or language; separation of groups, review of prior learning; direct instruction of new material; oral word reading practice; word sort practice activity; written practice; and lesson review. The lessons were designed to be multisensory, including visual (video, slideshow), oral (repetitive word reading), and tactile activities (syllable isolator device, morpheme flip cards, word sorts, writing). Additionally, each segment in a lesson was intended to move quickly and keep the students focused and motivated. While all components were necessary, if time was short, the written component was modified. For each lesson, the following equipment and materials were used: computer with internet access, PowerPoint software, word sort board, paper and pencil. For the ST intervention, the syllable isolator device and spelling rules poster were utilized, while for the WC intervention, the morpheme flip cards and the word origins poster were utilized.

At the close of each lesson, the interventionist praised the participants for his or her hard work and let them select a candy or small toy (with parental approval). Larger items were given when the student finished assessments and when the intervention was completed. Interventionists also used an incentive at any time to keep participants on track and engaged. Each of the 20 lessons lasted for 30-35 minutes.

Phonemic Syllable Types Intervention. The primary goal of the ST intervention was word reading based on syllables. Vowel sounds, syllable skills and essential reading rules were explicitly taught. Even so, the objective was not to reteach primary grade reading skills, if that were even possible, but instead to reacquaint students with

fundamental principles to enable them to read many multisyllabic words with little to no extra effort.

The ST intervention instructional sequence alternated between a direct instruction lesson and a review lesson covering the previously learned material. The syllables types were ordered as follows: review of vowels, syllables, and words; closed syllables with short vowels; closed syllable affixes; open syllable with long vowels; vc"e" with long vowels; "r" controlled vowel syllables; vowel team pairs with long vowels; vowel team digraphs with new vowel sounds; vowel team diphthongs with two vowel sounds; final root word syllables. Affixes were embedded in syllable type lessons and explicitly taught for sound only. However, the teacher defined words as needed for student understanding (see Appendix J for a complete list of multisyllabic words taught in each lesson). The lesson sequencing was as follows:

- Review of vowels, syllables, and words (lesson 1);
- Closed syllables with short vowels (lessons 2&3);
- Closed syllable affixes (lessons 4 & 5);
- Open syllable with long vowels (lessons 6 & 7);
- VC"e" with long vowels (lessons 8 & 9);
- "r" controlled vowel syllables (lessons 10 & 11);
- Vowel teams - pairs with long vowels (lessons 12 & 13);
- Vowel teams - digraphs with new vowel sounds (lessons 14 & 15);
- Vowel team - diphthongs with two vowel sounds (lessons 16 & 17);
- Final root word syllable (lessons 18&19);

- All syllable types review (lesson 20).

Word reading strategy included the following steps: 1) isolate syllables by finding vowels; 2) orally read syllables left to right; and 3) reread syllables left to right then make a whole word. For instance, if the word of the day was “concentrate”, the student would first find the vowels (o,e,a), recognize that the “o” in “con” is short, the “e” in “cen” is short, and the “a” in “trate” is long, then read the syllables left to right, “con” -“cen”- “trate”, and finally read the whole word, “concentrate.”

The syllable isolator device was a manipulative created for segmenting syllables and used periodically throughout the lessons. Words on cards were placed into the device where the teacher or student could uncover only the syllable to be read. The vowels in these cards were color coded according to sound: light blue for short vowels; red for long vowels; gray for silent “e”; light green for “ar”; gray-blue for “or”; orange-yellow for “er”, “ir”, “ur”; pink for vowel teams; purple for vowel digraphs; dark pink for vowel diphthongs; and dark yellow for final root word “le”, “tion”, “sion, ture.”

The lessons also included word sorts or word study categories, and posters of syllable types with color coded vowels. The word sorts task required students to sort by number of syllables, vowel sounds, syllable types, prefixes, suffixes, and base words. These activities were designed to cement the principles taught during the intervention.

Morphological Word Chunking Intervention. The primary goal of the WC intervention was word reading based on morphemes. While syllable instruction has been standard practice in early reading, specific morphemic awareness outside of prefixes and suffixes appears to be lacking in current reading/vocabulary programs. Several sources were relied upon to develop the WC intervention, including work by Bauer (2007),

Palumbo, Kramer-Vida and Hunt (2015), Bromo (2016), Oz (2014), Weill (n.d.), and Goldup (2010). The goal was to explicitly teach the most common free and bound morphemes, the eight inflectional morphemes, the most used Anglo-Saxon derivational morphemes, and introduce the most common Latin and Greek roots and affixes. The WC intervention program was also designed to review knowledge of vowel-syllable connections, parts of speech, as well as prefix and suffix meanings to provide struggling students with a practical strategy to tackle unfamiliar words.

Approximately 10 affixes were taught each day of the WC intervention.

Determining how many affixes were taught was based on several factors, including the likelihood students were familiar with the affixes being taught, the type of affix (inflectional, derivation part of speech, derivation change in part of speech, origins), and the complexity of the Greek or Latin stem. The affixes were derived from several common affixes and roots lists including Scholastic.com, McEwan (2008), and Lubbock, TX ISD. The Lubbock ISD included the affixes and stems found in the shorter Scholastic and McEwan lists, which contained the meaning and examples, but additionally was separated by grade level, included origin of each word, and gave grammatical information on parts of speech. The sequence of lessons was as follows:

- Review vowels, syllable chunks, words, part of speech (lesson 1);
- Root/base morphemes and affix morphemes chunks (lesson 2);
- Inflectional morpheme suffixes with multisyllabic words (lesson 3);
- Prefix morphemes chunks (lessons 4 & 5);
- Suffix morpheme chunks (lessons 6 & 7);
- Three morpheme chunks (lessons 8 & 9);

- Four morpheme chunks (lesson 10);
- Five or more morpheme chunks (lesson 11);
- Word origins (lesson 12);
- Latin prefixes, suffixes and roots (lessons 13, 14 & 15);
- Greek prefixes, suffixes and roots (lessons 16, 17 & 18);
- Latin and Greek hybrids (lesson 19); and word chunking review (lesson 20).

The WC intervention, like the ST intervention, included word sorts: affixes (prefix, suffix, base word, or combination); parts of speech (noun, verb, adjective, adverb); type of common morpheme (inflectional or derivational); and origin of morpheme (Anglo-Saxon, Greek or Latin). Additionally, the WC intervention included morpheme flip cards, word origin posters, and word family boards. These activities allowed students to add as many affixes as possible to a root/base word, identify the part of speech for each derivation of the root/base word, and identify the origin (see Appendix J for a complete list of morphemes taught in each lesson).

Reading for meaning strategy included the following steps: 1) find the root word (or stem) by removing affixes; 2) determine the meaning of the root word; 3) determine the meaning of affixes; 4) add the affix meanings to root meanings; and 5) read the whole word and state the meaning. For instance, if the word of the day was “submariner,” the student would look for the base word (i.e., “marine”) and determine its meaning (i.e., “sea/aquatic”). Next, the student would look at the prefix “sub” meaning “under” and then the suffix “er” which designates a person. The student would then read the whole

word, “submariner” and state the meaning such as “someone who works under the water” or simply “sailor”.

Data Analysis

Statistical analyses were performed using Matlab. Given the small number of participants in each group, Kruskal-Wallis tests were conducted, with group (ST *vs* WC *vs* control) as the independent variable and the posttest-pretest raw score differences as the dependent variables to determine whether a significant difference existed among the three groups on each measure (i.e., WRMT WA for research question 1, MAA for research question 2, WRMT WI for research question 3, DMA for research question 4 and DIBELS for research question 5). The Benjamini-Hochberg (BH) procedure was used to control for False Discovery Rate (FDR). Effect sizes were calculated using Hedges *g*, which is particularly appropriate for small sample sizes (Hedges, 1981).

CHAPTER FOUR

RESULTS

This study focused on two alternative instructional approaches used in middle school for multisyllabic word reading. The following five research questions were addressed: 1) After treatment, is there any difference among the three groups in decoding skill?; 2) After treatment, is there any difference among the three groups in MA?; 3) After treatment, is there any difference among the three groups in overall word reading?; 4) After treatment, is there any difference among the three groups in multisyllabic word recognition?; 5) After treatment, is there any difference among the three groups in reading fluency?

Descriptive Statistics

The descriptive statistics of the students enrolled in the study are provided in Table 1. Kruskal-Wallis tests were conducted to determine whether there were any differences in grade level or non-verbal IQ among the three groups. No statistically significant difference was found for grade ($H(2) = .75, p = .636$), tier level ($H(2) = 2.44, p = .295$), or non-verbal IQ ($H(2) = .07, p = .963$). Potential differences in gender among groups were analyzed using a Chi-square test. No significant difference was found, $\chi^2(2, N = 25) = 1.06, p = .587$.

Kruskal-Wallis tests were also conducted to examine whether there were any pretest differences among the three groups on the behavioral measures. Results did not reveal any significant difference at pretest on the standardized measures, including the WRMT WI ($H(2) = 1.20, p = .550$), the WRMT WA ($H(2) = .1.15, p = .562$), and the

DIBELS ($H(2) = .27, p = .874$). There were no significant differences on the researcher-created measures of DMA ($H(2) = .082, p = .957$) and MAA ($H(2) = .875, p = .646$).

Table 1

Descriptive Data

		<u>Control</u>		<u>WC</u>		<u>ST</u>	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Total		7	28%	9	36%	9	36%
Grade	6th	3	43%	3	33%	1	11%
	7th	1	14%	2	22%	3	33%
	8th	3	43%	4	44%	5	56%
Gender	Male	4	57%	8	89%	7	78%
	Female	3	43%	1	11%	2	22%
WASI	58-85	4	57%	5	56%	6	67%
	85-107	3	43%	4	44%	3	33%
Tier	1	3	43%	3	33%	2	22%
	2	3	43%	3	33%	2	22%
	3	1	14%	1	11%	2	22%
	SPED	0	0%	2	22%	3	33%

Note. WC = Word Chunking, ST = Syllable Types, WASI = Wechsler Abbreviated Scale of Intelligence, SPED = Special Education

Data Analysis

Data were collected on four measures (WRMT, DIBELS, MAA, DMA). Mean raw scores and standard deviations are reported for each measure and each group in Table

2. Results of the Kruskal-Wallis tests conducted for each measure are reported below

(See Table 3 for effect sizes and 95% confidence intervals of each pairwise comparison between the three groups).

WRMT Word Attack. The WRMT WA subtest was used to examine whether there were any differences among the three groups in decoding skill gain after treatment. No significant group differences were found on the WA posttest-pretest score difference, $H(2) = .67, p = .715$. Effect sizes of the pairwise comparisons between groups suggested that the control group trended toward better improvements than the WC group and ST group on decoding (see Table 3).

Morphological Awareness Assessment. The MAA was used to examine whether there were any differences among the three groups in MA gain after treatment. No significant group differences were found on the MAA posttest-pretest score difference, $H(2) = 1.16, p = .560$. While the performance of the three groups on the MAA was lower on posttest than pretest, effect sizes suggested that this decrease was somewhat smaller for the WC group than the other two groups.

WRMT Word Identification. The WRMT WI subtest was used to examine whether there were any differences among the three groups in word reading gain after treatment. Results revealed no significant effects on posttest-pretest WI score differences, $H(2) = 1.29, p = .525$. Comparisons between the WC group and either of the two other groups yielded small positive effect sizes (see Table 3). This was due to the WI scores showing a small pretest-posttest increase in the WC group, but a small pretest-posttest decrease in the ST and control groups.

Decodable Multisyllable Word Assessment. The DMA was used to examine whether there were any differences among the three groups in multisyllabic word

recognition gain after treatment. Results did not reveal any significant group differences on the DMA posttest-pretest score difference, $H(2) = 3.57, p = .168$. Effect sizes of the pairwise comparisons between groups showed that the ST group trended toward better improvements than both the WC group and the control group on multisyllabic word decoding skills (See Table 3).

DIBELS Oral Passage Reading. DIBELS assessment was used to examine whether there were any differences among the three groups in reading fluency gain after treatment. Results did not reveal any significant group difference on the DIBELS posttest-pretest score difference, $H(2) = 1.71, p = .425$. Effect sizes of the pairwise comparisons between groups showed that the ST group trended toward better improvements than the WC group on reading fluency (See Table 3).

Table 2
Means and Standard Deviations

		Control Group			Word Chunking Group			Syllable Type Group													
		Pretest			Posttest			Pretest			Posttest										
		<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	Range							
WI	7	31.1	2.8	28-35	29.9	4.2	23-36	9	29.3	4.1	23-36	30.4	4.4	25-36	9	29.7	5.2	23-40	28.8	5.9	20-3
WA	7	16.4	5.1	6-22	18.3	5.2	9-26	9	18.8	3.8	11-23	16.4	3.4	10-20	9	17.3	7.1	8-25	16.9	4.8	9-22
DIBELS	7	109.3	16.5	82-126	117.0	28.5	74-160	9	108.7	26.4	71-155	108.6	28.0	74-156	9	113.6	31.2	56-164	125.2	30.6	70-17
MAA	7	28.9	8.0	15-38	22.7	7.6	11-31	9	25.6	10.5	6-40	21.8	8.5	7-35	9	27.8	10.7	11-40	19.9	7.7	10-3
DMA	7	62.7	8.3	46-73	77.4	4.7	72-83	9	63.6	10.4	50-81	76.1	7.1	65-85	9	56.1	18.9	24-84	75.4	11.4	56-9

Note. WI = Word Identification, WA = Word Attack, DIBELS = Dynamic Indicators of Basic Early Literacy Skills, MAA = Morphological Awareness Assessment, DMA = Decodable Multisyllabic W Assessment, M = Mean, SD = Standard Deviation

For the CI values, please separate the two numbers by a comma (e.g., -2.12, 2.99)

Table 3

Effect Sizes (Hedges g) and 95% Confidence Intervals

Comparison	<u>WI</u>		<u>WA</u>		<u>DIBELS</u>		<u>MAA</u>		<u>DMA</u>	
	<i>g</i>	<i>CI</i>	<i>g</i>	<i>CI</i>	<i>G</i>	<i>CI</i>	<i>g</i>	<i>CI</i>	<i>g</i>	<i>CI</i>
WC vs Control	.44	-2.12 2.99	-.96	-2.98 1.05	-.37	-10.04 9.29	.24	-4.07 4.55	-.27	-4.00 3.46
ST vs Control	.09	-2.02 2.19	-.73	-2.19 .74	.15	-11.84 12.14	-.36	-2.82 2.10	.53	-3.55 4.60
WC vs ST	.46	-1.48 2.39	-.43	-2.36 1.50	-.68	-8.28 6.92	.47	-3.36 4.30	-.83	-4.43 2.77

Note: WC = World Chunking, ST = Syllable Types, WI = Word Identification, WA = Word Attack, DIBELS = Dynamic Indicators of Basic Early Literacy Skills, MAA = Morphological Awareness Assessment, DMA = Decodable Multisyllabic Word Assessment, CI = Confidence Interval

CHAPTER FIVE

DISCUSSION

This study investigated the effectiveness of two alternative reading interventions on middle school struggling reader skills for phonemic decoding (research question 1), morphological awareness (research question 2), word reading (research question 3), multisyllabic word recognition (research question 4) and reading fluency (research question 5). The phonological-based intervention (ST) was focused on the six syllable types while the morphologically-based intervention (WC) was focused on morphemes and affixes.

Overall, the results of the present study did not reveal any significant difference between the two intervention strategies, or between the intervention groups and control group. However, effect sizes pointed to several trends. First, the ST group showed better improvements than both the WC group and the control group on multisyllabic word decoding skills (DMA pretests-posttest score differences) as well as better improvements than the WC group on reading fluency (DIBELS pretest-posttest score differences), as suggested by effect sizes ranging from moderate to large among the pairwise comparisons (See Table 3). Second, comparisons between the WC group and either of the two other groups only yielded small effect sizes regarding word reading (WRMT WI pretest-posttest score differences) and morphological awareness (MAA pretest-posttest score differences). By contrast, the control group showed better improvements than the WC group (large effect size) and ST group (moderate effect size) on decoding (WRMT WA pretest-posttest score differences).

The present findings are discussed in the context of overall effectiveness of ST intervention, overall effectiveness of WC intervention, and transfer skills to oral reading fluency, which was not directly taught in either of the intervention approaches. Factors that are common to both ST and WC intervention implementations and which could also explain the lack of significant findings in the present study are discussed in further detail in the Limitations section.

Overall Effectiveness of Syllable Type Instruction

Dividing words into syllables based on the six syllable types (ST) was the basis for one treatment group intervention used in this study. The underlying hypothesis was that this group would not only improve multisyllabic word reading, but also outperform the WC group on decoding. While there were no significant differences among the three groups, results suggest that the ST group trends toward better improvements than both the WC group and the control group on multisyllabic word decoding skills (strong and moderate effect sizes, respectively). There are a couple of possible reasons for this outcome, which include the ST group receiving more direct practice on multisyllabic words and the WC group appearing to have a higher cognitive load during the lessons than the ST group. The potential impact of such differences in pace and cognitive load could be directly tested in future studies focusing on whether students getting a fast-paced intervention with a higher cognitive component do better or worse than students getting a slower paced intervention with extra practice.

Still, the present findings overall contrast with previous studies showing that syllable and decoding instruction strongly increases student reading outcomes. For instance, Gathercole (2006) found that students who have a strong background in

phonemic awareness can use enunciations to tackle multisyllabic words. Likewise, Nunes, Bryant, and Barros (2012) found that middle school students often use decoding and phonic awareness skills to read words. Strategies like the word reading strategy utilized in the present study have also been shown to be effective in teaching multisyllabic word reading (Lenz & Hughes, 1990; Rosenthal & Ehri, 2008).

In their research on word reading, Bhattacharya and Ehri (2004) found improvements in students who studied syllable division (another strategy which was used in the present ST intervention) compared to students who did not. However, it should be noted that the most gain was observed in 3rd graders compared to 4th and 5th graders. By contrast, participants in the present study were from higher grades (6, 7, and 8), thus suggesting that syllable division may be less effective with older students.

Overall Effectiveness of Word Chunking Instruction

The other treatment group in this study focused on chunking parts of word units into morphemes, or the smallest unit containing meaning. The underlining hypothesis was that this group would improve multisyllabic word reading while also outperforming the ST group on morphological derivation and affix meanings. Results did not show any evidence in favor of these hypotheses. Pairwise comparisons between the WC and ST groups, and between the WC and control group, respectively, showed only small effect sizes at best. Word reading somewhat improved in the WC group while it decreased in the ST and control group. In addition, while the performance of the three groups decreased on the MAA, effect sizes suggested that this decrease was somewhat smaller for the WC group than the other two groups. Overall, these findings contrast with the previous research showing that a solid understanding of morpheme units often results in

better performance when inferring meaning (e.g., Wysocki & Jenkins, 1987), spelling (Goodwin & Ahri, 2010), and comprehension (Nagy, Berninger, & Abbot, 2006).

Because poor readers rarely read all the letters in a word, there is evidence suggesting that a robust knowledge of affixes and roots can enhance decoding skills of multisyllable words (Shefelbine, 1990).

Reviewing the research on morphological intervention conducted between 1986 and 2006, Reed (2008) found that there is a significant relationship between MA instruction and reading improvement. In particular, seven studies with strong effects included root word instruction combined with affix instruction on targeted grade-level reading development. While the present study also focused on adding affixes to base words, it additionally included identifying Greek and Latin stems which often appeared to overwhelmed students. It is thus possible that outcomes would be different if more emphasis were to be placed first on base word and affixes combinations with additional practice and wait for students to have a solid grasp of those concepts before introducing the complex and intimidating Greek and Latin root study. This aspect would benefit from being further investigated in a follow-up study.

Transfer Skills to Oral Reading Fluency

Oral fluency is the ability to read accurately, at a steady rate, and with expression based on the mood of the text. The present study attempted to demonstrate that intensive word-level intervention - whether phonemic-based or morphology-based – would transfer to fluency-level improvements. While the results did not show any significant differences among the three groups, effect sizes suggested a trend toward the ST group having somewhat better improvements than the WC group on the reading fluency measure (i.e.,

DIBELS). By contrast, the WC group's reading fluency remained stable from pretest to posttest (see Table 2). The previous literature regarding learning transfer to reading fluency is somewhat mixed. For instance, Denton et al. (2011) found that increased decoding skills following intervention was not accompanied by increased fluency skills, while several other studies showed improvements in fluency based on more intensive reading interventions (Herman, 1995; Young, Bowers & MacKinnon, 1996). Together, these results thus suggest that transfer to reading fluency may require a more comprehension intervention approach.

Limitations

There are several limitations that could explain the discrepancy between the findings of the present study and the previous research including small sample size, short length of intervention, too many tier 1 students included, inadequate IQ score data, counter-balancing of assessment forms, and possible teacher effect.

First and foremost, this study used a nonparametric method to account for the small sample size to relieve the issue of normality assumption, however, this did not resolve the issue of limiting the power of a small sample size. Two students dropped out in the middle of the study. Small sample sizes could affect internal validity (Tannock et.al 2018). The population size was small and with the criteria that parents must pick their child up after school prevented many from participating. Additionally, some students already had afterschool activities.

Next, while the length of the interventions was selected to be compatible with current RTI models, it was relatively short. Each intervention lasted every day for 20 sessions (about four weeks). By contrast, among the studies reviewed in the literature,

only four had shorter intervention spans (Barth & Elleman, 2017; Bhat, Griffin & Sindelar, 2003; Bhattacharya & Ehri, 2004; Wagner & Espin, 2015), while fourteen others had considerably longer intervention spans ranging from 8 weeks (Barth et al. 2016) to almost a full school year (Berkeley et al. 2012; Diliberto, Beattie, Flowers, & Algozzine, 2009; Frijter et al. 2013; Goodwin, 2016; Spencer & Manis, 2010; Stacy et al. 2016; Sukhram & Monda-Amaya, 2017; Wanzek et al. 2003).

A third limitation was the fact that there were several tier 1 students included in the study. The inclusion of these students was based on recommendation by their teachers as being good candidates for a reading intervention program. Using a random assignment of the students for each of the three groups, the control group ended up being composed of about 43% (3 out of 7) tier 1 students which may have thus accounted for some of the gains observed in the control group.

Another limitation was that several students presented unusually low non-verbal IQ scores on the WASI. During the Block design subtest, it was apparent that some students had never seen a block design pattern and could not make the connection that the colors on the blocks corresponded to the colors on the protocol in order to recreate the picture with the blocks. Additionally, some students could not visualize what came next in the series of images on the Matrix Reasoning subtest. Students with IQ scores lower than 85 are often considered “slow learners,” (Swanson, 1999, p 525-526). However, using a cutoff score of 85 was not possible because of the small sample size and the fact that the very low scores observed for some of the students call into question the validity of the WASI scores for the current study.

A fifth limitation included the use of different forms (A and B) at pretest and posttest for the DMA and MAA. All participants received form A for the pretest and form B for the posttest to avoid item repetition. This precluded counterbalancing the difficulty of one test over another and could explain the lack of gain for some of the researcher created measures.

Finally, separate teachers implemented the ST and WC interventions so they could focus on one intervention area and not inadvertently mix the two methods. While this approach shows merit, it also comes with the potential for introducing a confounding effect of teacher effectiveness. Both teachers were experienced, yet it remains possible that one could have been potentially more effective than the other in the implementation of the instructional methods they were assigned to. Training the teachers on both intervention methods and alternating them throughout the intervention period could help minimize this potential effect in a follow-up study.

Implications

The present research was based on previous literature showing that PA/decoding and MA/word chunking are effective strategies not only for primary grades but for struggling middle school readers as well. At the same time, the effectiveness of the RTI model in middle and high school is still debated for several reasons. First, the fact that the RTI model of moving students to a more intensive tier level, due to lack of response to intervention at the present level, appears to work well for most students in lower grades (Vaughn & Fletcher, 2012), yet it does not mean replicating that system with older students will work successfully. Second, research on RTI programs in middle school suggests that too much time is devoted to non-instructional tasks like transitions,

classroom preparation, collecting homework, interactions with students (Ciullo et al., 2016), closing the reading gap in middle school maybe “overly ambitious” (Vaughn et al., 2010, p. 16), older students have been exposed to multiple evidence-based reading strategies (Vaughn & Fletcher, 2012), scheduling makes intervention implementation time challenging (Al Otaiba, Calhoun, & Wanzek, 2010), and tier 2 students need more intensive instructional time than offered in the present RTI model (Vaughn & Fletcher, 2012). While the present study was not designed to directly test the implementation of a RTI model, the length of the ST and WC interventions was in line with current RTI practices (about four weeks). The absence of significant improvements for either short-term approaches further suggests the need for longer/more intensive intervention programs with middle school struggling readers.

Conclusion and Future Directions

This study focused on the effect of two types of interventions, phonological-based and morphological-based, that have been found to be effective in early grades. While the findings did not confirm the initial hypotheses, they revealed several interesting trends regarding the ST intervention, and pointed to the potential need for longer and more intensive interventions in order to show significant improvements in middle school struggling readers. Even so, this may continue to be a difficult research endeavor as each student comes to the reading table with individual strengths and weaknesses in these areas. Which instructional approach is the best to meet their needs? Probably a combination of both with the flexibility to concentrate educational efforts in weaker areas over a longer span of intervention.

Research focused on middle school reading interventions remains scarce. While the majority of studies looked at reading interventions in the early years, more research should be devoted to middle school to ensure reading gaps are closed before they go into high school. Additional research on whether long term interventions during the middle school years are more effective than short term interventions is still needed. Possibly a full semester of syllable type and morphology chunking intervention could have shown improvements for these students over their peers.

Finally, there has been considerable research regarding the teaching of phonics and PA, while teaching MA is still lacking evidence-based approaches (Goodwin, 2016). The best ways to incorporating MA into middle school reading intervention programs that are effective, rigorous, systematic, and age appropriate should thus be a goal of both research and practice.

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Appendix A

Profile of the Middle School Struggling Reader

	Study	PB	MB	WL	FL	CL	TD	SR	RD	ID	EE	LE
1	Nelson et al. (2014)	x		x					x	x		
2	Kearns et al. (2016)	x	x	x		x			x		x	x
3	Stacy et al. (2017)	x	x	x			x		x		x	x
4	Cirno et al. (2013)	x	x	x	x	x	x	x				
5	Larsen & Nippold (2007)		x	x			x					
6	Nagy et al. (2006)	x	x	x	x	x	x					
7	Miciak et al. (2014)	x		x	x	x		x				
8	Roman et al. (2009)	x	x	x			x					
9	Bhat et al. (2003)	x		x					x			
10	Galletly et al. (2009)	x		x				x				x
11	Dennis (2012)	x	x	x	x	x		x				
12	Hock et al. (2009)	x		x	x	x	x	x	x			
13	Denton et al. (2011)				x		x	x				
14	Etmanski et al. (2016)	x		x		x	x	x			x	x
15	Buly & Valencia (2002)			x	x	x		x				
16	Ritchey et al. (2015)	x		x	x	x	x	x				
17	Duff et al. (2015)			x			x	x				
18	Catts et al. (2006)	x				x	x	x				
19	Etmanskie et al. (2016)			x		x	x	x			x	x
20	Catts et al. (2012)			x		x	x	x	x			x

Note: PB = Phonologically-based deficit; MB = Morphologically-Based deficit; WL = Word-Level difficulties; FL = Fluency-Level difficulties; CL = Comprehension-Level difficulties; TD = Typically Developing Reader; SR = Struggling Reader; RD = Reading Disability; ID = Intellectual Disability; EE = Early Emerging Reading Disability; LE = Late Emerging Disability.

Appendix B

Middle School Reading Interventions

	Study	PB	MB	WL	FL	CL	TD	SR	RD	ID
1	Diliberto et al. (2009)	x		x				x	x	
2	Tressoldi et al. (2007)	x		x					x	
3	Spencer & Manis (2010)				x	x		x	x	
4	Barth & Elleman (2017)					x	x	x		
5	Barth et al. (2016)					x	x	x		
6	Berkeley et al. (2012)	x		x	x			x		
7	Goodwin (2016)		x		x	x	x	x		
8	Bhat et al. (2003)	x	x						x	
9	Brown et al. (2016)		x	x		x			x	x
10	Wagner & Espin (2015)			x	x	x		x		
11	Frijter et al. (2013)	x		x	x	x			x	
12	Sukhram et al. (2017)				x	x		x	x	
13	Calhoun, et al. (2010)	x		x	x	x			x	
14	Meyer (1982)	x		x					x	x
15	Wanzek et al. (2003)	x		x	x	x			x	x
16	Bauman et al. (2003)	x	x				x			
17	Stacy et al. (2016)	x		x					x	
18	Bhattacharya et al. (2004)	x		x				x		

Note: PB = Phonologically-based focused; MB = Morphologically-Based focused; WL = Word-Level objective; FL = Fluency-Level objective; CL = Comprehension-Level objective; TD = Typically Developing Reader targeted; SR = Struggling Reader targeted; RD = Reading Disability targeted; ID = Intellectual Disability targeted.

Appendix C

To the Parents of _____
2018

August 8,

Dear Parents,

Start your child's new school year off right with a 6-week afterschool reading program to give them multi-syllable word attack strategies they can use all year!

My name is Perry Loudon, and I have been a teacher here at RMS for 11 years. I am also a doctoral student at MTSU in the Literacy Studies Department doing research on reading intervention for struggling middle school readers.

Beginning August 20, I will begin implementing two after school multi-syllabic word reading intervention programs here at RMS for 6 weeks. Both programs will run from 3:15 to 4:00 Monday – Friday. One program will be phonologically based (letter-sound correspondence) using the 6 traditional syllable types. The other program will be morphologically based (word parts with meaning) using base words, prefixes, suffixes and Greek and Latin roots.

There is no cost for this program, but I ask that parents commit to keeping their child in for the duration of the program and pick up their child between 4:00 and 4:30 each day. You will receive a copy of your child's pre-assessment scores and results after the intervention program is completed. Students will receive incentives for motivation including small toys, candy, ice cream, and other motivational items. If you do not want them to have a particular item, let me know and I will substitute another incentive.

All personal information regarding your child will be safeguarded and no personal information will be used for the publication of the study. If you choose to allow your child to participate, a consent form must be signed before any assessment or program intervention is started. See reverse side for dates and information about the intervention programs.

If you would like to participate in this program, please fill out the bottom portion of this letter and return it or if you would like more information on this program, you can also email me.

Thank you,
Perry Loudon, EdS.
Loudonp@rcschools.net

After School Multisyllable Word Reading Intervention Programs

Please check one:

____ I am interested in the program, and ***would be able*** to have my child picked up after school.

____ I am interested, but my child ***would not*** be able to be picked up after school.

Child's Name	Grade	Parent Name
Email Address	Cell Phone	Best Time to Call

After School Multisyllable Word Reading Intervention Program

Assessments: Students will be assessed before the intervention programs begin and after completion. These assessments will be for IQ, phonological awareness, morphological awareness, oral word reading, oral reading fluency, 6th grade academic words, and low-frequency words.

General Program Information: Both interventions will be 20 sessions long and will use similar resources and materials. If a child must be absent, the previous day's session will be made up during lunch recess or other times during the school day.

Syllable Type (ST) Program: This program teaches the 6 syllable types or spelling patterns found in most English words. Students will practice reading multisyllable words by identifying the syllable on the left, then reading the next syllable(s) in successive order, such as *happiness* = *hap* > *pi* > *ness*.

Word Chunking (WC) Program: This program teaches students to identify meaningful parts of words such as base words, prefixes, suffixes, and roots from Greek Latin origins. Students will practice reading multisyllable words by first finding and identifying the base word, then any prefixes, and then any suffixes, such as *unhappily* = *happi(y)* > *un+happi* > *un+happi+ly*.

August

8-10 – Parent Letters distributed

13-17 – Consent forms signed, Student Interest forms completed, and IQ test started

20-24 – IQ testing completed, Initial Assessments and random assigning to either the ST or WC groups

27 – Intervention sessions begin

September

3 & 13 – No sessions on these dates

25 – Anticipated end of intervention sessions*

26-28 – Final Assessments

October

1-3 – Final assessments continued

4 – “Graduation” Party

*schedule may be adjusted as needed to complete all 20 sessions

Appendix D

Student Interest Survey

ID: _____ Grade: _____

Age _____ Birthday month and year (please do not provide the day) _____

Adults who live with me: _____

Brothers and sisters: _____

Special friends: _____

What I like to do most at home: _____

My favorite hobbies: _____

My favorite book(s) and magazine(s): _____

If I had one wish, it would be... _____

School would be better if... _____

One thing that I am really good at is... _____

My All-Time Favorites:

TV show: _____

movie: _____

song: _____

musical group: _____

type of pizza: _____

color: _____

car: _____

sports team: _____

vacation place: _____

game: _____

subject: _____

teacher: _____

3 that I like or want:

candy: _____

small toys _____

DVDs: _____

CDs: _____

books: _____

Appendix E

DMA

Decodable Multisyllabic Word Assessment (DMA) Form A

Read the following real words, pausing for 2 seconds between words.

disingenuous	discretionary	oddity
biometric	migratory	equalize
stratagem	unquestionably	corrective
veritable	residence	conformity
irrelevant	convention	observable
economical	thermosphere	dictator
perception	circumscribe	Maturity
distinguish	covetousness	Intensity
expeditious	hypersensitivity	telegraph
diagnostician	reinstate	security
nationalistic	disenchantment	

Decodable Multisyllabic Word Assessment (DMA) Form A

Student ID Code _____	Date _____		
Automaticity	Decoded	Partial	Unknown
A/3 Points	D/2 Points	P /1 Point	U/0 Points
___ disingenuous	___ discretionary	___ oddity	
___ biometric	___ migratory	___ equalize	
___ stratagem	___ unquestionably	___ corrective	
___ veritable	___ residence	___ conformity	
___ irrelevant	___ convention	___ observable	
___ economical	___ thermosphere	___ dictator	
___ perception	___ circumscribe	___ maturity	
___ distinguish	___ covetousness	___ intensity	
___ expeditious	___ hypersensitivity	___ telegraph	
___ diagnostician	___ reinstate	___ security	
___ nationalistic	___ disenchantment		

Automaticity	Decoded	Partial	Unknown
A/3 Points	D/2 Points	P /1 Point	U/0 Points
Total Correct = / 32			Total Incorrect = /32

Total Points Score = _____/96

Decodable Multisyllabic Word Assessment (DMA) Form B

Read the following real words, pausing for 2 seconds between words.

stupidity	confession	cultural
precision	mortality	excessive
movement	enjoyment	entirely
finality	intensity	agility
hopeless	locality	preference
conformity	darkness	exhaustive
confidence	security	dependence
manager	colonial	maturity
confusion	heavenly	reference
sincerity	fertility	
friendly	backward	

Decodable Multisyllabic Word Assessment (DMA) Form B

Student ID Code

Date

Automaticity	Decoded	Partial	Unknown
A/3 Points	D/2 Points	P /1 Point	U/0 Points

___stupidity	___confession	___cultural
___precision	___mortality	___excessive
___movement	___enjoyment	___entirely
___finality	___intensity	___agility
___hopeless	___locality	___preference
___conformity	___darkness	___exhaustive
___confidence	___security	___dependence
___manager	___colonial	___maturity
___confusion	___heavenly	___reference
___sincerity	___fertility	
___friendly	___backward	

Automaticity	Decoded	Partial	Unknown
A/3 Points	D/2 Points	P /1 Point	U/0 Points
Total Correct = / 31			Total Incorrect = /31

Total Points Score = _____/93

Appendix F

MAA

Morphological Awareness Assessment Form A ID _____ Date _____

Part 1: Select the *best* meaning from the following words containing prefixes and suffixes.

Practice: ***Subscript*** = a. spoken under the breath b. written below
 c. written above d. spoken above

1. **Dismount** = a. to climb on a horse b. to remove oneself from a high object
 c. to break something d. to get up on something
2. **Impolite** = a. having good manners b. not showing proper identification
 c. having poor eating habits d. not showing good manners
3. **Indefinite** = a. having no ending period b. lasting for a known length of time
 c. lasting overnight d. having a short period of time
4. **Mistreat** = a. to be nice b. to kill someone
 c. to treat with kindness d. to treat someone cruelly
5. **Prepaid** = a. to pay in advance b. to pay afterwards
 c. to pay on payments d. to pay by check
6. **Recount** = a. to forget b. to tell about something that happened before
 c. to make up a story d. to tell something for the first time
7. **Illegible** = a. perfectly written b. not visible
 c. cannot be read d. able to see through an object
8. **Undecided** = a. to make a choice b. not having made a choice
 c. to make a dedication d. not having to decide
9. **Nontoxic** = a. not poisonous b. having a taste of chemicals
 c. venomous d. something that is poisonous
10. **Breakable** = a. capable of drinking from b. not being able to be broken
 c. not made of glass d. capable of being broken easily
11. **Dampen** = a. to make soggy b. to make dry
 c. to make slightly wet. d. to drown
12. **Thicker** = a. a larger width b. a smaller width

- c. same height and width d. the same width
13. **Equality** = a. being unequal b. the state of being the same
 c. to make lighter d. to make better
14. **Peaceful** = a. a place of stress b. to be distraught
 c. a place of effort d. to be free from disturbance
15. **Digestible** = a. unable to be eaten b. able to be eaten
 c. unable to make one sick d. able to be swallowed
16. **Squirmy** = a. moving very slowly b. incapable of moving
 c. wiggly d. not moving
17. **Dearest** = a. one of the closest relationships b. a baby animal
 c. having the closest relationship d. disliked
18. **Honestly** = a. with untruthfulness b. dishonest
 c. with truthfulness d. done with honor
19. **Decoration** = a. something used for adornment b. something used for playing
 c. something used for painting d. something used to make bigger
20. **Useless** = a. not fulfilling the intended purpose b. fulfilling the intended purpose
 c. partially fulfilling the intended purpose d. using for another purpose
21. **Softness** = a. having a state of being hard b. a sponge
 c. having a state of being pleasing to the senses d. being easy to break apart
22. **Anticlimax** = a. having a suspenseful ending b. against excitement
 c. against movie endings d. having a boring ending
23. **Biology** = a. the study of rocks b. the study of living organisms
 c. the study of the astronomy d. the study of fossilized organisms
24. **Circumference** = a. a straight line b. the enclosed of a boundary of a rectangle
 c. a curved line d. the enclosed boundary of a circle
25. **Intervene** = a. to join with another b. to continue a course of action
 c. to assist in a fight d. to come between to prevent a course of action
26. **Postdate** = a. overdue material b. assign a date earlier than the actual one
 c. past the date d. assign a date later than the actual one

27. **Transportation** = a. a single writer b. a group of writers
c. a joint writer d. another reader
28. **Polygram** = a. a word with no syllables b. a word consisting of only one syllable
c. a word containing two syllables d. a made-up word
29. **Geocentric** = a. a person who rebels against the rules b. a person against forms
c. a person who follows accepted rules d. a person who is a con artist
30. **Monologue** = a. when two people talk b. a long speech by one person
c. a written record d. a short debate

Part 2: Derivation (forming new words from base words)

Add a Prefix to the following words to complete the sentence.

Practice: Agree. The student _____ with his teacher. (dis)

Use the following prefixes only: **super- en- pre- im- un- trans- re- fore- in- mis-**

1. **Possible.** The task was _____ without help.
2. **Correct.** The student's test answer was _____.
3. **Behave.** If you _____ there will be consequences.
4. **Arrange.** The _____ meeting was great.
5. **Move.** _____ your shoes before walking on the carpet.
6. **Able.** She was _____ to swim back to shore.
7. **Cage.** The plan was to _____ the diseased animal.
8. **Runner.** The horse and buggy was a _____ of the gas-powered automobile.
9. **Action.** The sale person completed the _____ in record time.
10. **Highway.** The new _____ around the city had five lanes in the same direction.

Add a suffix to each word to complete the sentence.

Practice: Agree. She was _____ to the offer.

Use the following suffixes only: **-tion -ly -y -er -ness -ful -est -able -en -less**

11. **Black.** The chef will _____ the fish before serving.
12. **Catch.** The _____ missed the ball.
13. **Arm.** Mother had an _____ of groceries.

14. **Collect.** He broke the _____ pottery by accident.
15. **Celebrate.** There will be a great _____ next Sunday.
16. **Age.** The woman looked _____ in the gown.
17. **Brave.** The players fought _____ but came up short in the game.
18. **Foolish.** There was a lot of _____ when the teacher left the classroom.
19. **Tiny.** The bird was the _____ creature she had ever seen.
20. **Mess.** Nothing could be found in the _____ basement.

Morphological Awareness Assessment Form B ID _____ Date _____

Part 1: Select the *best* meaning from the following words containing prefixes and suffixes.

Practice: **Subscript** = a. spoken under the breath b. written below
c. written above d. spoken above

1. **Discontent** = a. not limited b. happy
c. depressed d. not joyful
2. **Impatient** = a. not restless b. not easygoing
c. sick person d. not showing good judgment
3. **Inconsiderate** = a. not thoughtful b. very kind
c. not controlled d. having good attention
4. **Misapplied** = a. not wrong b. to do something right
c. not used right d. to do something without thinking
5. **Preconceived** = a. not determined b. something that just happened
c. reflected on something d. to think about beforehand
6. **Redoubled** = a. increased twice b. to do again
c. to make up something d. to dribble a ball again
7. **Illogical** = a. not having space b. good advice
c. not making sense d. not having to decide
8. **Uncommitted** = a. to forget b. not deciding
c. to make up a story d. to tell something for the first time

24. **Circumvent** = a. to go around something b. to circle the earth
c. to go through something d. the enclosed boundary of a circle
25. **Interstate** = a. two countries combined b. between time zones
c. between two states d. within the regions of a country
26. **Postscript** = a. late payment b. written afterwards
c. past the writing date d. written beforehand
27. **Transatlantic** = a. inside the ocean b. across the continent
c. across the ocean d. between two countries
28. **Polynomial** = a. one number b. multiple variables
c. numbered groups d. many words
29. **Geology** = a. the study of rocks b. the science of living things
c. the study of countries d. the science of outer space
30. **Monoculture** = a. when two people talk b. one ethnicity
c. a written record d. one world

Part 2: Derivation (forming new words from base words)

Add a Prefix to the following words to complete the sentence.

Practice: Agree. The student will _____ with his teacher. (dis)

Use the following prefixes only: *super- en- pre- im- un- trans- re- fore- in- mis-*

1. **Considerate.** The girl was _____ and always had to be first.
2. **Connect.** Mom had to call the electric company to _____ our power after the storm.
3. **Abundance.** There was a _____ of crops from our corn field.
4. **Mortal.** In the movie, the superheroes were _____.
5. **Finger.** He broke his _____ on the playground.
6. **Understanding.** There was a _____ between the coach and the parent.
7. **Danger.** The dog was _____ of being hurt crossing the road.
8. **Packaged.** The meal was _____ in small boxes with easy carry handles.

9. **Scientific.** The student's biology proposal was rejected because it was not _____.

10. **Formation.** The crowd was amazed at the _____ of the old building.

Practice: Agree. She was _____ to the offer.

Use the following suffixes only: **-tion -ly -y -er -ness -ful -est -able -en -less**

1. **Honest.** The child was _____ sorry about the broken glass.

2. **Strength.** The overworked employee was _____ after a rest period.

3. **Fear.** The lion was a _____ hunter.

4. **Size.** The boy returned with a _____ amount of toys for his guest.

5. **Peace.** The transition of power from the current president to the president-elect was _____.

6. **Prevent.** The accident was totally _____ if the boy had listen to his teacher.

7. **Pollute.** _____ had ruined the natural beauty of the forest.

8. **Grouch.** The old man seemed to the kids as always _____ .

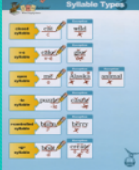
9. **Synthesize.** The sounds of trumpets were coming from the _____.

10. **Nervous.** The applicant's _____ was obvious when he spilled his drink.

Appendix G

ST Group PowerPoint

Syllable Types Class



Lesson 18: Final Root Word Syllable

1

Prior Learning

- Can you tell me all the syllable patterns we have studied so far?
- What three sounds do r-control syllables make?
- How many letter patterns make those sounds and can you give me an example of each?
- Read the following words: *according harmonica ordinary centimeter turning fired squirming*

2

❖ Word Sort Practice

- Sort the following words into categories of
 - Closed syllable only
 - At least Open syllable
 - Ends in VC "e"
 - has a Towel Team
- Read all the words

3

Syllable Type: Final Base Word Syllable

- Final syllables include
 - "le" bubble
 - "ture" creature
 - "tion/sion" eviction tension
- The words are found at the end of base words and can have suffixes added to them
 - bubbling creaturelike evictions tensioned

4

Syllable Type: Final Base Word Syllable

- Final "le" can be added to words ending in b, c, p, st, z
- Rule: when adding a suffix, the "e" is usually dropped, e.g. "babbled."

b	(ble)	bable
c	(cle)	e.g. icicle
f	(fle)	ruffle
p	(ple)	cripple
st	(stle)	thisist
z	(zle)	e.g. drizzle.

5

Syllable Type: Final Base Word Syllable

- In the final "ture" syllable, the "t" makes a "ch" sound as in the word "capture."
- In a final "tion, and "sion" syllable, the "t" and the "s" make the "sh" sound as in the words "option" and "mansion."
- Suffixes can still be added onto final base word syllables, e.g. "nation" to "national."

6

Read the Following Words

sample *friction* *dependable*
nonprogrammable *entitlement*
nondiscrimination *miscalculation*
missionaries *cradling* *popsicle*
creature *mixture* *titled*

7

Written Practice

□ Divide the words into syllables using a "/" and mark each syllable with an "O" open, "C" for closed, "V-e" for VC "e", "RC" for r-controlled, "VT" for vowel team, or "FB" for final base word syllable.

c v-c FB c

Example: **en/tit(e)/le/ment**

8


Lesson Review

- ✓ Answer the following questions:
 - ✓ What are the three final base word syllables? _____
 - ✓ What sound does "ture" make at the end of a word? _____
 - ✓ What sound does "tion" and "sion" make? _____
 - ✓ What is the Final Base Word Syllable marked? _____

9

Appendix H

WC Group PowerPoint



WC Group
Morphological Word Chunky
SESSION 4

Review Prior Learning

- ▶ What are the two types of morphemes?
- ▶ How are they different?
- ▶ What are the 8 inflectional morphemes?
- ▶ Inflectional morpheme effect which parts of speech use?

Word Reading for Meaning Strategy

- ▶ Step 1) find the root word (or stem) by removing affixes (prefixes & Suffixes);
- ▶ Step 2) determine the meaning of the root word;
- ▶ Step 3) determine the meaning of affixes;
- ▶ Step 4) add the affix meanings to root meaning; and
- ▶ Step 5) read the whole word and state the meaning.

unstopping

Word Reading for Meaning Strategy

- ▶ Step 1) find the root word (or stem) by removing affixes (prefixes & Suffixes); step 2) determine the meaning of the root word;
- ▶ Step 3) determine the meaning of affixes;
- ▶ Step 4) add the affix meanings to root meaning; and
- ▶ Step 5) read the whole word and state the meaning.

un+stop(p)+ing (why is the "p" doubled?)
unstopping

new
non
re
ing

Practice Worksheet: Parts of Speech

1. Read the base word and state the meaning
2. Identify the suffix
3. Read the whole word
4. Explain how the suffix changed the base word.

Deviational Morphemes

Common Prefixes :

<i>anti-</i>	<i>de-</i>	<i>dis-</i>	<i>en-</i>
<i>il-</i>	<i>im-</i>	<i>in-</i>	<i>ir-</i>
<i>mis-</i>	<i>non-</i>	<i>over-</i>	<i>pre-</i>
<i>re-</i>	<i>sub-</i>	<i>un-</i>	

Inflectional Morphemes

Affix	Meaning	Part of Speech	Affix	Meaning	Part of Speech
▶ anti-	against	adjective	▶ mis-	wrongly	verb
▶ dis-	not; opposed to	verb	▶ non-	not	noun or adjective
▶ en-	cause to	noun > verb	▶ over-	over; too much	noun
▶ il-	not	adjective	▶ pre-	before	noun
▶ im-	not	adjective	▶ re-	again	verb
▶ in-	not	adjective	▶ sub-	under	noun
▶ ir-	not	adjective	▶ un-	not; opposite of	verb

Review

- ▶ What are the two types of morphemes?
- ▶ How are they different?
- ▶ Name the 8 inflectional morphemes.
- ▶ Name some common derivational prefixes.

Appendix I

Syllable Types Instructional Words

1. Review of vowel, syllables, and words

Demo: attic basket conflict platinum epidemic optimistic consensus Wisconsin
transcontinental

2.&3. Closed CVC Words (short vowel)

Demo	2-syllables		3-syllables	4-syllables	5-syllables
hat	insist	basket	platinum	epidemic	transcontinental
egg	attic	solid	consensus	optimistic	
lid	conflict		Wisconsin		
on					
fun					

4&5. Closed Syllable Affixes

Prefixes: un, en, il, in, im, ex, trans, dis, mis, non

unsung	enlist	illogic	inept	imprint	extracts
transcript	disconnect	nonsense	misbrand		

Suffixes: ed, en, es, est, ing, ful, ish, ic, ment, ness, s

mended		sunken	foxes	fastest	running
thankful					
smallish		kinetic	punishment	madness	wishful lamps

6&7. Open CV (long vowel)

Demo	2-syllables	3-syllables	4-syllables	5-syllables
agent	cubic	potato	ultimatum	undocumented
be	rally	ironic	tutorial	
hi	behind	octopus	macaroni	
go				
unit				
shy				

Affixes

Prefixes: de, pre, pro, re

Suffixes: ly, ty, y

redo	professing	sixty	classy
precept	detract	logically	

8&9. VC+e

Demo	2-syllables	3-syllables	4-syllables	5-syllables
safe	inane	formulate	incomplete	uncompensated
Pete	dispute	absolute	confiscating	overexposed
pine		declining	illustrate	
cone				
mule				

10&11. R-controlled – ar, or er, ir, ur

<u>Demo</u>	<u>2-syllables</u>	<u>3-syllables</u>	<u>4-syllables</u>	<u>5-syllables</u>
car	garlic	porcupine	orthodontist	aborigine
horn	merchant	leotard	deodorize	memorialize
her	skirmish	arthritis	armadillo	exterminating
bird	murmursarcastic	meteorite		
burn	referendum	supersonic	pulverize	

12&13. Vowel Teams (Pairs) ai, ay, ea, ee, ie, oa, oe, ue

<u>Demo</u>	<u>2-syllables</u>	<u>3-syllables</u>	<u>4-syllables</u>
bait	prevail	encroaching	superhighway
play	charcoal	neighborly	speedometer
eat	portray daydreamer		
jeep	heiress indiscreet		
eight	ponytails		
boat	creature		

14&15. Vowel Teams (Digraphs) oo, ea, ei, aw, au

<u>Demo</u>	<u>2-syllables</u>	<u>3-syllables</u>	<u>4-syllables</u>
snow	loophole	revenue	overthrowing
toe	crowbar	foolishness	
new	country	screwdriver	
school	tiptoe	dominoes	
cue	venue		

16&17. Vowel Teams (Diphthongs) oy, oi, ow, ou, ew

<u>Demo</u>	<u>2-syllables</u>	<u>3-syllables</u>	<u>4-syllables</u>
coin	Yawned	corduroy	unlawfully
boy		dinosaur	embroidering
trout		allowance	aeronautics
plow		tenderloin	unemployment
saw		bountiful	acknowledging
fraud		counterpart	

18&19. Final C+le, tion/sion and ture

<u>Demo</u>	<u>4-syllables</u>	<u>5-syllables</u>	<u>6-syllables</u>
cradle	dependable	nonprogrammable	nondiscrimination
option	entitlement	miscalculation	enthusiastically
<i>creature</i>			

20. Review of all syllables types

Appendix J

Affixes and Stem Origins

1. Introduction to Morphemes Chunks and Parts of Speech

*Demo : decided example directly important consider telephone
completely agenda mistaken forgetful exactly borrowing*

2. Ten Most Common Affixes

*dis- il- mis- non- pre- -er
 -ly
-ity -ness -y*

3. Inflectional Morphemes (Suffixes)

*-s/-es -'s -ed -s -ing -en -er
 -est*

4. Derivational Morphemes - New Word, Same Part of Speech

*anti- dis- il- im- in- ir-
 mis-
non- ob- op- pre- un- re-
 -ist
-ship -ate*

5. Derivational Prefixes - New Word, Different Part of Speech

*en- -less -ful -able -ly -er
 -or
-ar -y -ous -al -ion -ence
 -ment -ness -ity -ish -ic -ive
 -ify -ize*

6. Prefix, Suffix, Parts of Speech, and Meaning Review

7-9. Other Common Derivational Suffixes

*-ity -ate -y -er -ify -less -or -ize -ful -ar -ish -
ness
-ic -ment -ive -ist -ous -ship -ly -ion -ence*

10. Derivational Prefix and Suffix Review

11. Word Origins Introduction

-ard (French) -ish (German) -kin (Dutch) -nik (Russian)

Greek and Latin (ancient Rome) are the most predominant *bio-* (Latin) *aqua* – (Greek)

12.&13. Latin Prefixes

*a- ab- co-/con-/com- intra- mini- semi- omni- homo- ultra- uni- bi-
tri- oct- deca/dec- centi- milli-*

14. Latin Suffixes

*-an/ian -ess -al/ial -ent/ant -ent/ant -ous/iou/eous -ive/itive/ative -age -
cede/ceed
-tract -form -ism*

15. Latin Roots and Stems

*-aqua- -act- -mit- -anni- -duct- -man- -rupt- -scrib/script- -tox- -temp- -
dict-
-frac-/frag- -gen- -ject-*

16. Greek Prefixes

*a-/an- amphi- ana-/an- apo-/ap- cata-/cat- dia-/di- dys- endo-/ento-/end-/ent-
epi-/ep-
exo-/ecto- hypo-/hyp- meta-/met- para-/par- peri- pros- syn-/sym/syl-/sy-*

17. Greek Suffixes

*-ism -ist -ize -gram -graph -logue, -log -logy -meter, -metry -oid -
phobe,
-phobia -phone*

18.&19. Greek Roots and Stems

*-aero- -archi- -arch- -dem- -photo- -scope-
-geo-
-ped-/pedo- -therm- -morph- -philo- -chron- -path-
-phon-*

20. Review of all Morphemes