THE EFFECT OF MORPHOLOGY INSTRUCTION ON PERFORMANCE GROWTH OF SEVENTH-GRADE STUDENTS: A QUASI-EXPERIMENTAL STUDY

by

Erin Kathleen Pizzo

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

The purpose of this quasi-experimental, pretest-posttest, nonequivalent control group study was to evaluate the effectiveness of morphological instruction that includes word matrices and word sums with middle school students. This study compared the overall reading performance growth as measured by the Northwest Evaluation Association: Measure of Academic Performance (NWEA MAP) scores of students who received morphological instruction with word matrices and word sums with the growth of students who did not receive morphological instruction that included word matrices and word sums. A convenience sample of 100 students English-speaking students from a rural, public middle school in northwest Pennsylvania was used for the study. Data were collected using the NWEA MAP assessments that the students took during their English Language Arts classes. The treatment group consisted of seventh-grade students who were instructed using word matrices and word sums in the vocabulary lessons they received. The control group consisted of seventh-grade students who received vocabulary instruction that did not include word matrices or word sums. Reading performance results were analyzed using ANCOVAs to compare the treatment groups' pretest and posttest results with the control groups' pretest and posttest results. The researcher hypothesized that statistically significant differences would exist in overall reading RIT scores, information text RIT scores, and/or vocabulary RIT scores. Results indicated that a statistically significant difference for all three components as described above did not occur during this study.

Keywords: morpheme, morphological awareness, morphology, reading comprehension, zone of proximal development.

Dedication

This dissertation is dedicated to my support system. First and foremost, this is dedicated to my Lord, who gave me the free will and perseverance to complete this major undertaking. This body of work is also dedicated to my family, who supported me throughout this long process. My husband, children, and parents encouraged me along the way as they spent weekends without me and endured the frustrating times. As a fellow educator, my husband encouraged me throughout the entire process and championed my belief in supporting students to be their very best. My children, Gabriella and Samuel, are a constant reminder that all that I am and do is a tribute to them.

My mentor did not realize what an impact she had on my view on education. Darcie Moseley is someone to whom I looked to when making tough decisions to meet our students' needs. She helped me to cultivate my compass, making my true north the constant question "What is best for kids?" For this, I am forever indebted to Darcie.

My path to completing this degree was long and nontraditional. I want to thank all of the professors that supported me along the way. Dr. Fitzpatrick, Dr. Hahnlen, and Dr. Stanley each had influence on my unique path. Dr. Lunde, Dr. Keafer, and Dr. Tyler guided me to completing the study, and for that, I am forever grateful.

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List of Abbreviations

Analysis of Covariance (ANCOVA)

Analysis of Variance (ANOVA)

Common Core State Standards (CCSS)

Developing Content Area Academic Language (DCAAL)

English Language Arts (ELA)

Measure of Academic Performance (MAP)

National Assessment of Education Progress (NAEP)

National Reading Panel (NRP)

Rausch Unit (RIT)

Simple View of Reading (SVR)

Zone of Proximal Development (ZPD)

CHAPTER ONE: INTRODUCTION

Overview

According to reading experts, education is in the midst of an adolescent literacy crisis (Biancarosa, Palincsar, Deschler, & Nair, 2007). The literacy stakes are higher than ever for secondary students. Students can no longer leave school with a third-grade reading level without being at a severe disadvantage in society and the global job market. Global competition becomes even more daunting when "44% of fourth-grade and 46% of eighth-grade children failed to meet the standards for reading proficiency on the most recent Nation's Report Card" (National Assessment of Educational Progress, 2015, p. 1). As a result of falling test scores and an increasing presence of technology in the classroom, "a shift of attention away from what texts to teach and toward teaching students how to interact with texts" (Carillo, 2017, p. 34) is taking place. Providing adequate literacy instruction for secondary students is more challenging than it is for primary students because the literacy skills necessary to comprehend secondary content are more complex.

> In considering how to improve the academic achievement of our nation's struggling readers and writers, it is critical to remember that only 10 percent of students struggle with decoding (reading words accurately), and thirty years of research by the National Institute of Child Health and Human Development (NICHD) have provided solutions for these decoding problems. (Snow & Biancarosa, p. 11, 2003)

Chapter One includes a background of the adolescent literacy crisis followed by the problem statement and the purpose of the study. The chapter then reviews the significance of the study to the current body of research. Chapter One will also outline the research questions,

hypotheses, and relevant definitions of morphology, as well as the possible impact of morphology on reading.

Background

Reading is not intuitive for many students, as evidenced by the statistics that "approximately eight million people between fourth and twelfth grade struggle to read at grade level" (Snow & Biancarosa, 2003, p. 3). Over 70 percent of older students need remediation, and 30 percent of high school students are not graduating on time with a regular diploma (Greene & Winters, 2005). Dropout rates skyrocket for those who enter ninth grade in the lowest 25 percent of their class compared to the highest-performing students (Carnevale, 2001). Crosson and McKeown (2016) pointed out that "as students transition from elementary to middle school they are expected to learn from content-area texts that are not only conceptually dense but also are more linguistically complex than those they encountered during the elementary years" (p. 148).

Decoding is taught from preschool through third grade. After third grade, the emphasis shifts from learning to read to reading to learn. Comprehension strategies replace decoding instruction, and students who did not master the phonetic basis of the English language often struggle for much of their school careers (Samuels, 2002). The struggle is compounded by the vocabulary gap that many students exhibit in middle and high school. Biemiller and Slonim (2001) pointed out that educators are beginning to become aware that vocabulary development is a key educational component for student academic success.

Text selection is a challenge for struggling secondary students, as lower-level texts are often inappropriate for their age and background knowledge. Secondary students need to read challenging texts in order to demonstrate higher-level thinking, and according to Samuels (2006),

"the most important characteristic of the fluent reader is the ability to decode and to comprehend the text at the same time" (p. 9). Yet more difficult text can be inappropriate for students whose reading skills are underdeveloped. For instructional purposes, students should be encouraged to move out of their comfort zone and avoid reading text that is too easy, as this can lead to a lack of growth. Vygotsky (1930–1934/1978) called this theory the zone of proximal development (ZPD). Vygotsky proposed the idea that the potential for cognitive development depends upon the text falling within the ZPD, as texts that fall outside the zone are either too easy or too hard and add to neither the reader's speed nor comprehension. In essence, students need to engage in challenging work; otherwise, they will not develop academically.

A strong and growing body of research supports the influence of morphological awareness on literacy skill development. Apel, Wilson-Fowler, Brimo, and Perrin (2012) pointed out that as students move from elementary classrooms into middle grades, the influence of morphological awareness skills surpasses that of phonological awareness. There is also converging evidence that morphological awareness holds strong, positive associations with vocabulary knowledge (Anglin, 1993; Carlisle, 2000; Nagy, Berninger, & Abbott, 2006) and predicts reading comprehension (Carlisle, 2000). According to Lyster, Lerrag, and Hulme (2016), "Phonological, morphological, semantic, and orthographic processing are at work in the process of reading, but the corresponding roles of these processes have not been addressed in reading until recently" (p. 1270). Only a limited amount of research has been done on morphology and morphological awareness, and the research that has been done lacks the clarity and depth necessary for it to be used by teachers to make effective instructional changes in the classroom. Good, Lance, and Rainey (2014) pointed out that current research supports the value

of morphological awareness instruction, but the research is inconclusive on the subject of effectively incorporating morphological instruction into the classroom.

The review of literature will demonstrate that while reading research has begun to include morphological awareness and morphological analysis, there are still a great void of evidence on how to translate the research into effective instructional practices in the classroom. This research study attempted to fill some of that void by pairing morphological instruction with word matrices and word sums and examining the influence on student outcomes.

Problem Statement

Reading comprehension is one of the most essential skills that a child fosters during the school years. In this current culture of testing, students must demonstrate reading proficiency on annual state exams. Researchers also recognized that reading difficulties are not always simple to address. For example, Tong, Deacon, and Cain (2013) recognized that reading requires a complicated skill set and suggested there are many factors that could lead to poor reading comprehension. In elementary school, poor decoding and poor comprehension often go hand-in-hand. However, "a prominent yet veiled problem among students in upper elementary, middle and high school is that while they can read many do not understand what they read" (Mokhtari & Velten, 2015, p. 23). Giving secondary teachers the task of remediating literacy needs becomes problematic since the teachers are specialized to their content areas and not equipped to address struggling readers. Students are dropping out of high school at a high rate, and one major factor is that students do not have the necessary literacy skills to be successful with a high school curriculum (Kamil, 2003). The struggling student's plight becomes more evident as words become less decodable and more orthographically complex. Snow and Biancarosa (2003) noted that older students who struggle can read words accurately but are dysfluent, and as a result of

this dysfluency, reading comprehension is often compromised. The problem of poor comprehension is exacerbated when "they may not be able to generalize their strategies to content-area literacy tasks and lack instruction and knowledge of strategies specific to particular subject areas, such as math, science, or history" (Biancarosa & Snow, 2004, pp. 8–9).

The problem is that research has not addressed a specific, effective method for teaching students vocabulary that has immediate and wide-reaching results. This study sought to test the process of pairing morphological instruction with matrices and word sums to determine if these processes support long-term student vocabulary development.

Purpose Statement

The purpose of this quasi-experimental study was to evaluate the efficacy of morphological instruction that incorporates Latin bases as a predictor of reading growth of seventh-grade students (ages 12−13) at a rural middle school in the northeastern region of the United States. For the purpose of this study, reading performance growth, the dependent variable, was generally defined by the difference between winter and spring composite Rausch Unit (RIT) scores on the Measure of Academic Performance (MAP). The problem under investigation in this study was the lack of reading achievement among middle school students and how to improve reading comprehension through morphological instruction. Morphology instruction, the independent variable, was generally defined as instruction presented to teach students the structure and form of words (Carlisle, 2003). The National Assessment of Education Progress (NAEP, 2015) reported that students who achieved highly on vocabulary questions also achieved highly in reading comprehension. Overall, the NAEP report focused on students' recognition of word meaning and the integral role that vocabulary plays in reading comprehension. Since most literacy educators consider morphology to be a critical component

of reading development, secondary students will benefit from explicit morphology instruction. This research was performed on the assumption that if the findings suggested that morphology instruction be incorporated in the secondary literacy instruction, teachers would need to evaluate how they approach teaching reading comprehension strategies and implementing morphology instruction.

Significance of the Study

Since the institution of high-stakes testing, students have been expected to perform reading tasks at their grade level and not necessarily at their independent reading level. When students enter secondary school (Grades 7−12), they are bombarded more with academic content and receive less instruction on how to read or access that content. Today's students are in the midst of an adolescent literacy crisis (Biancarosa et al., 2007). Given the strong correlation between comprehension and vocabulary, this study aimed to identify the value of morphological instruction in an effort to improve secondary student reading comprehension.

Scholarly journals are publishing an increasing number of articles in the area of morphology, and books on reading and spelling instruction have begun including recommendations for instruction in morphological awareness (Carlisle, 2010). Carlisle (2010) went as far to say, "Given the current emphasis on educational research to identify effective practices, educators might want to know whether teaching morphological awareness holds promise for improving the reading and writing of school-age students and, if so, why this might be" (p. 464). Timothy and Cynthia Shanahan (2008) argued that disciplinary literacy should be a focus in middle school, as it has not been demonstrated that early reading skills naturally transfer into the more complex reading skills that are needed in middle and high school content classes. Early literacy instruction has not been shown to correlate with later growth in literacy for

students. Higher-level literacy skills are declining, and according to ACT (2005), the number of students who are being prepared for college-level work drops as students move through high school. Although teachers may be using a variety of instructional approaches to help students learn vocabulary and improve their reading comprehension skills, a single method of effective vocabulary instruction has not been identified (National Reading Panel [NRP], 2000).

The purpose of this study was to evaluate the usefulness of morphological instruction of Latin bases in middle school English language arts (ELA) class by comparing classrooms that implement morphological instruction with those that do not incorporate morphological instruction. By understanding the strategies and approaches that middle school readers use, educators can better guide effective use of these strategies in classroom instruction (Pacheo & Goodwin, 2013). Teaching students reading and language skills through vocabulary instruction remains an important task for educators. Additional research on the most effective way to design that instruction is clearly needed and will further the understanding of the impact of vocabulary instruction on students' reading comprehension (Brown, Lignugaris-Kraft, & Forbush, 2016). Middle school students, middle school teachers, and school administrators can benefit from the findings of this study. A morphemic approach to vocabulary instruction may equip students with the word analysis skills needed to define the meaning of new words and has the potential to improve reading comprehension (Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003; Ebbers & Denton, 2008; Reed, 2008). The results of this research have the potential to aid administrators and teachers in making curriculum decisions for middle school students who do not read on grade level.

Research Question

RQ1: To what extent, if any, is there a difference in overall reading growth performance scores of seventh-grade students who receive morphological vocabulary instruction versus seventh-grade students who do not receive morphological vocabulary instruction while controlling for prior achievement?

Definitions

1. *Morpheme* – According to Crosson and McKeown (2016), morphemes are "the smallest units of a word that carry meaning" (p. 149).
2. *Morphological awareness* – Morphological awareness, as described as by Carlisle (2010), is the "ability to reflect on, analyze, and manipulate the morphemic elements in words" (p. 466).
3. *Morphological knowledge* – Morphological knowledge is an understanding of the meaningful relationships among words, including the spelling of morphemes (Berninger, Abbott, Nagy, & Carlisle, 2010; Mullock, 2012).
4. *Morphology* – Carlisle (2003) described morphology as "the study of word structure and involves integrative linguistic processing that is centered around morphemes and combinations of morphemes" (p. 318).
5. *Reading comprehension* – According to RAND Reading Study Group (2002), reading comprehension is the "process of simultaneously extracting and constructing meaning through interaction and engagement with written language" (p. 11).
6. *Zone of proximal development* – The zone of proximal development is a concept proposed by Lev Vygotsky (1930–1934/1978) describing the learning ability of a student, which can be achieved through the scaffolding of a more advanced teacher.

CHAPTER TWO: REVIEW OF LITERATURE

Overview

This review of literature outlines basic morphological components in language, identifies the role of morphology in reading, provides an overview of classroom vocabulary practices, and reviews essential components in literacy instruction in content classrooms. The components of reading are defined, and their pedagogical contexts are shared to show the relatedness of the components in language.

Theoretical Framework

The term *comprehension* refers to both "a set of empirical phenomena and a theoretical construct" (Kintsch & Rawson, 2005, p. 210). Reading comprehension is widely agreed to be comprised of many moving parts. Researchers agree that several cognitive processes work together help the reader to decode and understand the text. Emerging from the complexity of these processes is the one main idea that "comprehension occurs as the reader builds one or more mental representations of a text message" (Kintsch & Rawson, 2005, p. 210).

Social constructivists believe that learners make sense of their world by connecting their prior knowledge with what they are learning. Negotiating meaning with others through discussion is the social aspect of constructivism that is supported by Vygotsky. Vygotsky (1930–1934/1978) viewed thinking and learning as contextualized social practices. Cambourne (2002) noted social constructivists have three core conventions: learning cannot be separate from context, the learner's goals are most important, and knowledge and meaning are socially constructed through negotiation, evaluation, and transformation. The meaning that the reader develops may or may not be the author's intended meaning.

Students need to be challenged at an appropriate level in order to attain a higher level of understanding. If learners are always enabled to stay in their comfort zone, there will be no growth. Vygotsky (1930–1934/1978) established a social development theory that outlined social interaction and a ZPD. According to Vygotsky, zone of proximal development is the difference between what a learner can do with and without assistance (Farrall, 2012). Vygotsky proposed the idea that the potential for cognitive development depends upon the ZPD, and research maintains that children's scaffolded learning experiences are necessary to their understanding (Vygotsky, 1930–1934/1978).

While students develop reading skills at different paces, there are certain milestones that language and behavior theorists have concluded are vital to the overall reading process. Chall (1996) described six stages of learning to read which correspond to these theories, and through these stages, the role of fluency can be understood. Stage 0 is the prereading stage, which ranges from birth to age six. By the time children in this stage enter the classroom, it is hoped that they can communicate their wants and needs and explain their experiences using specific vocabulary. Stage 1 is the initial reading or decoding stage and covers children ages six and seven in the first and second grade. In the initial reading stage, students start to leave behind pretend reading and start to engage in decoding basic text as well as engaging in some sight word reading. Stage 2 is known as the confirmation fluency stage and occurs in children ages seven and eight in the second and third grade. In this stage, children work to consolidate the skills they acquired in stage 1. Children become more fluent and automatic in reading more familiar texts. In stage 3, children read to learn more information. This stage takes place in children ages eight to 14 in fourth through eighth grade. Stage 3 is when children transition from learning to read to reading to learn. Children will use reading as a tool, create strategic reading skills, develop and identify

word meaning and prior knowledge, and have a singular viewpoint when reading. Graves (2004) suggested that "a limited vocabulary is a substantial obstacle to success in reading comprehension" (p. 81). A consequence of poor vocabulary is that readers become stuck in one of these three lower level stages of reading.

Stage 4 of Chall's (1996) reading development stages focuses on children accommodating multiple viewpoints and typically occurs in children ages 14 through 18 in ninth through twelfth grade. In stage 4, readers read materials from multiple viewpoints and work to improve their ability to think critically about their reading to gain a deeper understanding of the information. Stage 5 focuses on forming knowledge from reading higher-level or less concrete works, which helps the reader to construct his or her own viewpoint while critically analyzing the viewpoint of others. Stage 6, the final stage, is known for the construction and reconstruction of knowledge while reading. Readers in this stage are typically 18 or older and may be enrolled in higher education. These stages appear to indicate that literacy acquisition in any orthography may not be as simple as learning to decode using phonics during early grades and reading to learn during middle and secondary grades. In relation to Chall's (1996) levels of theoretical framework, "Reading comprehension and decoding may contribute in separable and interactive ways both in early childhood and middle childhood" (p. 308).

Chall (1996) was concerned with how to improve student achievement in the classroom, and, as a result, she made educational recommendations. The first recommendation Chall made was for a more "teacher-centered approach in the classroom" (Farrall, 2012, p. 23). Chall's (1996) recommendation encouraged teachers to be explicit in their instruction and to give clear indicators of when and how a skill was mastered. Chall's second recommendation focused on "the importance of closing the gap between the research community and teachers in their

classrooms" (Farrall, 2012, p. 23). The six stages of reading development were given to educators and researchers to monitor student reading and identify when a student was not "on track."

The Simple View of Reading (SVR) construct provides a specific framework for describing the processes and skills involved when readers comprehend texts (Gough & Tunmer, 1986). More specifically, the SVR predicts that those who struggle to comprehend text have difficulty in understanding written text as the result of deficits in language comprehension. As explained by Tunmer and Chapman (2012), the SVR is based on the concept that children's purpose in learning to read is to discover how print maps into their current schema of spoken language. Reading comprehension is considered to be the end result of a reader's word decoding and listening comprehension skills. In order to meet the desired outcome, children need to engage with both oral language and print language.

Due to the intent of this study, the research was focused on print language. The SVR notes that if children have difficulty recognizing words or understanding language as a whole, then they will likely have impaired comprehension of the text. As children develop into more proficient readers, both the amount and complexity of material they read increases. The SVR acknowledges that there are early stages of reading that rely more on sound-symbol relationships, while context-free word recognition can determine the development of orthographic understanding of specific words in later stages of reading (Tunmar & Chapman, 2012). Tunmar and Chapman's (2012) study used the same conceptual understanding that readers in middle school are typically engaged in the later stages of reading. It is important to take the SVR into account when researching reading development and comprehension because "the SVR has direct educational implications as it provides a conceptual framework for

designing appropriate teaching practices that target both decoding and comprehension skills" (Kendeou, Savage, & van den Broek, 2009, p. 354). Using word matrices, as was the protocol in the research study for this dissertation, gives a context-free environment while still allowing the students to make connections between related words via affixes and bases.

Researchers have taken a closer look at the SVR and whether the role of vocabulary should be modeled as "distinct from the general language comprehension ability, when the letter is assessed by measures of listening" (Braze et al., 2016, p. 436). Braze et al. (2016) presented data indicating that knowledge of vocabulary affected reading comprehension more than language comprehension. Tunmar and Chapman (2012) also made similar findings that vocabulary contributed to reading comprehension. Braze et al. (2016) further studied SVR with latent variable and regression analyses, with the results supporting Gough and Tunmer's (1986) understanding that vocabulary is a part of language comprehension. The study also noted that vocabulary is an integral part of general language competence in both younger and older students (Braze et al., 2016). The study brings up the point that understanding will be compromised if a text has words that are unknown to the reader. The authors believe that the issue is more complex since not all word knowledge is complete; readers can often garner enough information from the word's connotation rather than wholly relying on the word's denotation.

The cycle for struggling readers is problematic since struggling readers often fall prey to the Matthew Effect, a term coined by Robert Merton (1968). The Matthew Effect refers to the idea that in reading (as in other areas of life), "the rich get richer and the poor get poorer" (Morgan, Farkas, & Hibel, 2008, p. 187). Morgan et al. (2008) conducted a study to determine if there is a subgroup population that is more likely to experience the Matthew Effect. The study concluded that there were specific populations of students that were more affected by the

Matthew Effect than others. However, it was also noted that the Matthew Effect was somewhat one-sided in that students who read at a lower level were observed to experience the downward spiral effect of getting further and further behind, but there was no statistical data to corroborate the idea that richer readers continued to get richer (or better) at reading in the same upward spiral effect. The authors found that students who were considered to be at-risk, children with learning disabilities, and students living at a low socioeconomic status were at a greater risk for experiencing the Matthew Effect than their peers. Gender, race, and socioeconomic status illustrated how a "small set of background variables explained the relative reading progress of large subgroups of children in the United States" (Morgan et al., 2008, p. 196). Morgan et al. (2008) pointed out three limitations to their study. The first limitation listed considered the grade level in which the assessments occurred. Children in kindergarten through third grade were tested, limiting the data to elementary students. The second limitation of the study was that the authors did not directly test the "specific developmental model thought to cause the Matthew Effect" (Morgan et al., 2008, p. 196). The third limitation of the study was that the authors only entered a small set of external factors in their growth curve models. This limitation was expected as they used prior models and research to limit factors that may impede learning.

Perfetti, Landi, and Oakhill's (2005) framework of reading comprehension suggested morphology plays two roles in relation to reading comprehension: a direct role through a general linguistic system and an indirect role through the lexical system. In the linguistic system, morphology is said to affect reading comprehension by broadly leveraging comprehension processes. In the lexical system, morphology is said to attend to reading comprehension by facilitating word reading. The framework of reading comprehension suggests that morphology likely "serves as a structural guide for how meaning can be constructed through morphemes, the

building blocks of meaning in language" (Levesque, Kieffer, & Deacon, 2017, p. 2). Text can therefore be better understood by allowing morphology to act as a coordinator of meaning among the morphemes in complex and simple morphological structures.

Related Literature

Reading Comprehension

Reading comprehension is the ultimate goal of reading instruction (Snow, 2002). Kamil (2003) asserted that the understanding of written text, or reading comprehension, is an important skill for success both in and outside of the classroom. According to Perfetti et al. (2005), "A failure to develop a high level of comprehensions skill creates a severe obstacle to educational attainment" (p. 244). In order for students to understand what they read, they need accurate and fluent word recognition skills as well as language comprehension skills (Gough & Tunmer, 1986; Perfetti et al., 2005).

A very real and prominent problem among upper elementary, middle school, and high school students is that while these students can read (accurately decode and fluently read words), many do not understand what they read. Reading comprehension is defined as the "process of simultaneously extracting and constructing meaning through interaction and engagement with written language" (RAND Reading Study Group, 2002, p. 11). Studies on predictors of reading comprehension have historically looked at elementary school children, and as such, scientific interest in middle and high school students has been underrepresented (Curtis, 2002). Reading theory (RAND Reading Study Group, 2002) and reading research (Cain & Oakhill, 2007) have identified that by the time students reach third grade, they are expected to be able to read fluently. Problematically, however, many of these fluent readers have difficulties with reading comprehension outside of decoding issues (Biancarosa & Snow, 2004). Literacy researchers,

policymakers, and educators are aware of several issues that prevent students from comprehending what they read (Mokhtari & Velten, 2015).

Comprehension by its very nature is an event that can only be observed indirectly (Pearson & Johnson, 1978). Teachers often quiz students on text that was read and require the students to recall its gist or some major details, ask specific questions about the purpose of the text or its content, or request an interpretation of the text. These tasks, as intriguing or riveting as they might be, "are little more than the residue of the comprehension process itself" (Pearson & Cervetti, 2017, p. 13). Reading comprehension has been part of the classroom for as long as there have been schools, but the intent on the product has not always been the same. It was not until the 20th century that reading comprehension arrived as a "modal index of reading competence and performance" (Pearson & Cervetti, 2017, p. 14). There are two different possible explanations for why reading comprehension has not always been viewed as a hallmark of reading accomplishment. The first scenario focuses on the original intent of comprehension being delivered via oratory history. The second scenario centers on the idea that personal understanding was not a high priority (Mathews, 1966).

The tides turned in the 20th century when "the scientific movement and the changing demographic patterns of schooling in the United States conspired, albeit inadvertently, to bring reading comprehension into instructional focus" (Pearson & Cervetti, 2017, pp. 14–15). Immigration, the industrialization of society, the prohibition of child labor, and the introduction of mandatory school attendance laws all brought a demographic of children into the classroom that was never there before. A whole host of problems, most notably where to place these students, flooded classrooms. During this time, the behaviorist schools of thought strongly influenced the field of psychology (Pearson, 2000). With psychologists loaded with

"quantification and objectivity, they put their newfound scientific lenses to work creating cheap and efficient tests for beleaguered schools, the course of reading assessment was set" (Pearson & Cervetti, 2017, p. 15). Group-administered, multiple-choice, standardized tests became the norm. Individual assessments went to the wayside and so did the teacher's ability to use professional judgment in individualizing education.

Humans were not born reading; it is a process that continues to evolve along with the human mind (Wolf, 2007). Not everyone develops reading skills at the same rate or to the same depth and, as such, reading comprehension is not a universal skill set. Likewise, "all children develop enough implicit knowledge of morphology and syntax to understand their parents' instructions and communicate their needs, but many do not develop the metalinguistic and strategic knowledge of these systems required to actively parse written texts" (Kieffer, Petscher, Proctor, & Silverman, 2016, pp. 437–438). Despite intensive instruction, many children fail to achieve functional levels of reading comprehension.

Orthography

A deep, or opaque, language is said to be a writing system that focuses on but is not confined to both phonemes and morphemes, whereas a shallow, or transparent, language is said to be a writing system that focuses on but is not confined to speech sounds using one letter for each sound (Moats, 2009). English orthography is rich in that there are several reliable approaches to studying a word. Those approaches consisted of looking at the word's language of origin, its phoneme-grapheme correspondences, the position of a phoneme or grapheme in a word, the letter order and sequence patterns (orthographic conventions), and its meaning (morphology) and part of speech. A teacher must be familiar with the "linguistic units that

spelling represents—the phoneme-grapheme correspondences, spelling patterns, syllable constructions, and morphemes" (Moats, 2009, p. 72).

The study of deep and shallow orthographies has been reviewed by linguists for some time. Recently, studies have focused on the significance of the deep orthography of English and how the characteristics of a deep orthography impacts learning English. English is viewed as a deep orthography because word reading involves more than phoneme-grapheme conventions. Roots from long ago often dictate the spelling of the word even though the pronunciation differs from the root, yet the reader must use the base in the word to derive meaning. For example, the pronunciation shifts in *please* and *pleasure* even though the base, *please*, is the same in both words. In shallow orthographies such as Spanish, the vernacular is reliant on a strong phoneme-grapheme correspondence rather than these shifts, so Spanish readers tend to rely on decoding using a strong phoneme-grapheme relationship (Cuentos & Suarez-Coalla, 2009). English readers, however, rely on more than just decoding and use morphemes to help them to determine the meaning of words (Perfetti & Dunlap, 2008). Research shows that morphological awareness may help those learning English to decode and comprehend English text (Goodwin, August, & Calderon, 2015). These studies suggest that further research on how students read words above a second-grade reading level is relevant but scarce. Currently, there are few studies that have looked at the relationship between adolescent readers' orthographic knowledge and reading in general (Dennis & Kroeger, 2012).

Two major studies compare English and French orthographic nuances, including one conducted by Abbott et al. (2016). The researchers examined the relationships of French and English's morphophonemic orthography in word reading, spelling, and reading comprehension of students in early grades (first and second) and middle grades (fifth). The findings from the

study showed that assessment and instructional practices should be tailored to early or middle childhood. The authors of the study discussed the change from Anglo-Saxon–derived words in Grade 2 to French- and Latinate-origin words in Grades 5 and beyond. Anglo-Saxon words are often one- or two-syllable words, and French and Latinate words are often longer, three- to five-syllable words, and morphologically complex, with different grapheme-phoneme correspondences (Henry, 1993).

Berninger and Joshi (2016) explained that while the conventions for phonology, orthography, and morphology are important to reading French and Latin, these origins are seldom explicitly taught as a result of teachers not being taught themselves. These findings are important in relation to teaching morphology because other studies have proven the positive relationship between morphology and comprehension (Elleman, Lindo, Morphy, & Compton, 2009; White, Power, & White, 1989).

It is worth noting that most studies looking at the impact of morphology instruction on reading comprehension have not investigated how the morphology is taught. Brown et al. (2016) mentioned that "direct, instructional routine linking the meaning of a prefix to root words are effective" (p. 331); however, "additional research on the most efficient way to design that instruction is clearly needed and will further our understanding of the impact of vocabulary instruction on students' reading comprehension" (p. 331). The few studies that do include using matrices as a framework to teach morphology do not use the Northwest Evaluation Association: Measure of Academic Performance (NWEA MAP) assessments, a common assessment developed using over 10.2 million students from 23,000 schools in 49 states to examine student performance (NWEA, 2017).

Vocabulary

The NRP (2000) determined that a single method of effective vocabulary instruction has not been identified, and Beck and McKeown (1983) suggested that learning vocabulary is not an "all or nothing proposition" (p. 622). Vocabulary acquisition in children has been a topic of research for many years. Researchers want to know how children learn words and what makes the most impact on children's long-term vocabulary acquisition.

The researchers Hart and Risley (2003) led a two-and-a-half-year study in which they observed 42 families for an hour each month. The observers recorded what typically went on in homes with one- and two-year-old children who were learning to talk. The results demonstrated that families differed quite a bit in how regularly they provided literacy experiences. The study determined that it was these differences in the children's language experiences that was strongly linked to language accomplishments at age three. This study is important for educators as it explains why so children enter school come equipped with such a variety of vocabulary competencies. Hart and Risley (2003) found that "eighty-six percent to 98% of the words recorded in each child's vocabulary consisted of words also recorded in their parents' vocabularies" (p. 5). The study provided insight into not only how children acquire new words but also the rate of acquisition. The rate of acquisition was a surprising twist because the three-year-old children from families on welfare not only had smaller vocabularies than the children of the same age in professional families, but they were also adding words more slowly than their peers (Hart & Risley, 2003). The trajectory for students who had a slower rate of word acquisition at age three continued into third grade. The data showed in a follow-up study that vocabulary use at age three was strongly associated with vocabulary reading comprehension scores (Hart & Risley, 2003). The study provided the answer to why students enter school with a

variety of vocabulary abilities and set the stage for the effectiveness for core teaching practices and specific interventions.

Research over the past two decades has disclosed effective best practices for teaching vocabulary. Studies have addressed such issues such as what it means to know a word, size and growth of vocabulary, degrees of word knowledge, vocabulary assessment, sources of vocabulary learning, and instructional techniques to support vocabulary growth and development (Anderson & Freebody, 1981; Baumann & Kame'enui, 1991; Beck & McKeown, 1991; Graves, 1987; Nagy, Anderson, & Herman, 1987). Even with all of this information, teachers are still in the uncomfortable position of having to discern which vocabulary words to teach and how to teach those words. These decisions are especially important as vocabulary knowledge is closely linked to students' long-term academic achievement (NRP, 2000). Teachers know what the research says about good teaching practices in relation to teaching vocabulary, but they do not feel there is enough time in the class to follow research-based practices (Flanigan & Greenwood, 2007).

Middle-level content teachers face the difficulty that they do not always know how to implement the effective vocabulary practices that research supports (Flanigan & Greenwood, 2007). Content teachers went to school to learn how to teach their content, but more often than not, the instruction they received did not include how to teach students how to access the content through effective reading strategies. This conundrum is affecting students since the "role of academic vocabulary is the teaching of reading as undeniable, particularly when considering its close association with reading comprehension performance for all students" (Mokhtari & Velten, 2015, p. 24). Students are required to know the meanings of many sophisticated words in order to be successful in middle and high school curriculum. The underpinnings of teaching

vocabulary include teaching students to identify words, read fluently, and comprehend what they are reading (Ebbers & Denton, 2008). Researchers continue to identify how teaching vocabulary supports comprehension. Given the strong correlation between comprehension and vocabulary (Anderson & Freebody, 1981; Berninger et al., 2010) and the importance that vocabulary knowledge plays in a student's success, teachers and researchers cannot ignore the critical place in the curriculum that vocabulary instruction holds (Flanigan, Templeton, & Hayes, 2012). Teachers list students' difficulties in understanding texts in their content area as a result of a lack of sufficient vocabulary knowledge and teaching vocabulary words without positive long-term effects as two major obstacles (Harmon, Hedrick, & Wood, 2005). Teaching vocabulary is a robust endeavor. Inadequate vocabulary is strongly related to academic failure for students in Grades 3 through 12 (Becker, 1977).

As the vocabulary demands of textbooks increase at the upper elementary and middle school levels, many students begin to struggle with understanding their texts. Research indicates that students' vocabulary knowledge determines how well they understand texts (Baumann, 2005). A specific area of difficulty for students is academic vocabulary, the vocabulary that is necessary to learn and talk about academic subjects. According to Harmon et al. (2005), "The literature suggests that success in supporting vocabulary development in the content areas must consider students as word learners, the nature of content vocabulary, and the special features of effective instruction" (p. 262). Even though teachers and researchers agree on the value of teaching academic vocabulary, a general consensus of how to teach academic vocabulary has not been reached (Kieffer & Lesaux, 2007). As Mokhtari and Velten (2015) put it, "The bad news is that as a literacy community, we do not always do what works when teaching children to read and do so with comprehension" (p. 25).

The reoccurring theme that literacy researchers continue to find is that explicit instruction positively impacts vocabulary acquisition (Beck & McKeown, 1991; Blachowicz & Fisher, 2000; Graves, 1987; Stahl & Fairbanks, 1986). As research has shown that vocabulary knowledge and reading comprehension are correlated, vocabulary knowledge is a leading predictor of reading comprehension among children and young adults (Mokhtari & Velten, 2015). Instruction, repetition, and meaningful use are three features noted by researchers to support students in learning new vocabulary words for long-term use (Nagy, 1988). The role of academic vocabulary in teaching reading is clear, especially with its close association with reading comprehension performance for all students. Research has consistently shown over the past seven decades that vocabulary knowledge greatly contributes to students' reading comprehension performance (Baumann & Kame'enui, 2004). As a result of the nation's low performance in relation to global test scores, vocabulary has recently come into focus in state and national standards (National Governors Association and the Council of Chief State School Officers, 2010).

Morphology

Often overlooked, morphology instruction has much to offer vocabulary development. Morphological instruction teaches students to identify and analyze units of meaning (i.e., roots and affixes) within words to take on reading tasks. The relationship between morphological awareness and reading comprehension is well documented. Researchers contend that when students are given access to morphological problem-solving strategies within comprehensive vocabulary instruction, they can be better prepared to address vocabulary struggles within challenging text (Pacheo & Goodwin, 2013).

Since the English writing system represents sounds, syllables, and morphemes, it is considered *morphophonemic* in that both units of meaning and sound are represented in print. According to Treiman (1993), "The English writing system represents morphological as well as phonemic information" (p. 25). The morphophonemic understanding is necessary in order to determine what is related to orthographic conventions and what is related to English phonology (Venezky, 1999). The morphophonemic relationship in English is often overlooked; however, this relationship occurs when there is a change in pronunciation caused by change in the morphological structure of the word (Birsh, 2011). An example is found in the words *help* and *sail.* Both words are free morphemes, meaning that they stand on their own and do not have to be combined with other elements to make a word; they have meaning by themselves. The past tense of *help* is written as *helped*. The suffix *ed* phonologically represents the *t* phoneme. The past tense of the word *sail* is written as *sailed*. The suffix *ed* phonologically represents the *d* phoneme. Phonology does not drive the graphic representation of the words. Although the past tense morpheme is pronounced differently in *helped* and *sailed*, the morpheme is spelled as *ed* in both. As Treiman (1993) put it, "The English past tense morpheme is spelled in a consistent manner, ignoring predictable variations in its phoneme form" (p. 24). In fact, the suffix *ed* is realized as the morpheme and is a past tense marker. As such, "the meaningful parts of words are often spelled consistently even though the pronunciations change from one word form to another" (Moats, 2009, p. 66).

Another example of a morphological marker is in the word *sign*. The spelling retains the *g* in the base even though the reader does not "hear" the *g*. The phonology is evident when the base *sign* is within the word *signature*. The grapheme *g* is an etymological marker that is necessarily retained for related words such as *signature* and *signify*. Richard Venezky (1999)

eloquently explained this concept when he said that the "visual identity of meaningful word parts takes precedence over letter-sound complicity" (p. 197). The changes that occur during this process are what make English logical and predictable. Morphemes often maintain consistent spelling units because of their morphological boundaries even though the pronunciation may change. It is evident, then, that "morphology plays an essential role in language development" (Birsh, 2011, p. 65).

Language development is typically emphasized in kindergarten through second grade. As mentioned, third grade is typically the time when students transition from learning to read to reading to learn.

> From their earliest role in the emergence of grammar as a child passes beyond the single-word stage to the adolescent's urgent need to master Greek and Latin roots and affixes in preparation for the Scholastic Aptitude Test (SAT), morphological knowledge and mastery contribute to vocabulary growth, spelling, comprehension, and the richness of a student's written language. (Birsh, 2011, p. 65)

Marcia Henry (2003) wrote about this change, stating, "It cannot be assumed that by the end of third grade, children are even ready to learn all that must be learned about the structure of language as it relates to reading and spelling" (p. 101). In fact, literacy specialists and linguists agree that explicitly teaching morphological elements is essential at all stages in language development. According to Birsh (2011), "Across the school years, morphological knowledge is crucial to developing literacy" (p. 65). Reading researchers argue that middle school children will encounter many new words in their wide reading. These words are mainly transparent in their derived form, which can make their intended meaning simple to understand through word analysis (Carlisle, 2000). Since morphologically complex words are more common in written

language than spoken language, the secondary student is more likely to encounter these words than an elementary student (Nagy et al., 2006). Different strategies are needed to decode and spell polysyllabic words than those that were used for monosyllabic words in early elementary grades. Therefore, "the end of third grade is the time to introduce students to the Latin roots and Greek combining forms used frequently in social studies, math, and science texts" (Henry, 2003, p. 101).

Henry (2003) emphasized the importance of morphological and orthographic skills, "especially in longer words" (p. 105). Readers use their knowledge of morphemes and morphological structure in reading and writing morphologically complex words. Through morphological analysis, students can work out the pronunciation, meaning, and spelling of many words beyond those taught. Many of the deviations from the alphabetic principle in English spelling reflect the principle of maintaining a consistent spelling for morphemes (Chomsky & Halle, 1968; Venezky, 1999). Nagy and Anderson (1984) pointed out that academic language often contains longer words, and that length can be a result of affixes.

Perhaps one of the greatest strengths of morphological instruction is how it can build on and leverage what students already know. According to Pacheo and Goodwin (2013), "With effective instruction, teachers can guide students to deepen word knowledge and hone their strategy use to tackle and figure out previously unknown words" (p. 551). Morphological instruction shows great potential for improving vocabulary acquisition and overall text comprehension (Carlisle, 2010; Goodwin & Ahn, 2010). There is a strong relationship between morphological knowledge and literacy (Crosson & McKeown, 2016); however, the details of how to provide this compelling morphological instruction is not yet clear. One difficulty in

pinpointing the research on morphological instructional practices is that many studies vary in purpose and nature and are conducted across different languages (Goodwin & Ahn, 2013).

More and more research is being thrust into publications. Carlisle (2010) reviewed 16 studies that were related to the idea that morphological awareness instruction is a key component of literacy development (i.e., phonology, orthography, word meaning). In the review, Carlisle (2010) found "morphological awareness had the potential to contribute to students' literacy development in all three areas (morphemic structure, spelling, and meaning of written words), most notably when it deepened students' understanding" (p. 464). In reviewing the research, Carlisle (2010) noted that many studies have not been specific enough when reviewing how morphological awareness contributes to different areas of literacy, how research-based practices might result from these studies, and how to implement these practices in the classroom. Carlisle (2010) also drew attention to the underdevelopment of morphological awareness research at this point in time.

Goodwin and Ahn (2013) conducted a meta-analysis of morphological interventions in English to determine the effects of literacy outcomes for school-aged children. The meta-analysis examined 92 standardized mean differences from 30 independent studies. The findings from the study indicated that "children receiving morphological instruction performed significantly better on measures of literacy achievement than comparison groups" (Goodwin & Ahn, 2013, p. 257). Other results from the study suggested that unit of intervention, scope, length, and learner type did not relate to the effectiveness of the morphological instruction, while age and research design did make an impact to the differences in effectiveness. Effect sizes were stronger for younger students; middle school students' effect sizes were weaker in comparison. Lastly, the researchers found there were "larger effects for quasi-experimental than experimental

studies and for researcher-designed measures than for standardized measures" (Goodwin & Ahn, 2013, p. 257). The meta-analysis suggests that different types of morphological instruction support reading performance. Several of the mentioned instructional practices, such as identifying, segmenting, and building morphemes, teaching affix and base meanings, and teaching morphological patterns to support spelling, assist literacy achievement. Researchers also noted that morphological instruction still had a moderate effect on standardized measures, which shows the potential of morphological instruction engaging in cross-curricular literacy measures (Goodwin & Ahn, 2013, p. 280).

Several studies inspected possible connections between morphological awareness and direct and indirect reading comprehension via vocabulary. A study conducted by Kieffer and Box (2013) found that morphological awareness directly improved reading comprehension and indirectly assisted comprehension through both silent word reading and vocabulary of sixth-grade students. Kieffer and Lesaux (2012) found a direct relationship between morphological awareness and reading comprehension and an indirect relationship between vocabulary and reading comprehension.

Early reading success often predicts later academic success later children. Reviewing studies that show how morphological abilities impact the emergent reader helps researchers better understand how to help struggling readers and explain how to advance average readers. According to Kruk and Bergman (2013),

> Morphological ability contributes significantly to reading comprehension in children Grades 3 and 5, but the relationships are stronger for fifth graders because third graders are acquiring basic skills for recognizing complex words and have less exposure to such words than older children. (p. 12)

Kruk and Bergman (2013) investigated how early morphological processing abilities predicted later reading skills, how these early reading skills predict later morphological processing abilities, and to what extent the reciprocal patterns indicate underlying mechanisms. Prior studies (Kirby et al., 2012) noted that reading comprehension may be the reading skill most strongly influenced by early morphological abilities. The more often a reader encounters words with more than one morpheme, the more likely the reader is to develop morphological abilities (Kruk & Bergman, 2013). Morphological processes are likely to predict all reading outcomes, but decomposing, or breaking words into their separate morphemes, would be more encompassing as a predictor if strong initial morphological skill is necessary to facilitate reading development beyond the use of phonological awareness and vocabulary (Kuo & Anderson, 2006).

The study by Kruk and Bergman (2013) included 171 children enrolled in Grade 1. The students were assessed every six months, starting in the second half of first grade. Students were assessed a total of five times, ending at the end of Grade 3. The assessments used with students included the Test of Morphological Structure (morphological processing), the Woodcock Reading Mastery Test – Revised (word attack, word identification, word comprehension, and passage comprehension), the Comprehensive Test of Phonological Processing (phonological awareness), and the Wechsler Abbreviated Scale of Intelligence (vocabulary). The results indicated "reciprocal relations were identified between early morphological processing abilities and early reading ability and later reading and morphological processing abilities" (Kruk & Bergman, 2013, p. 27). The findings indicated that strong early morphological processing skills can have a long-term influence on later reading skills (Kruk & Bergman, 2013). The longitudinal design of this study helped researchers to analyze beginning readers' development.

However, there were several limitations to the study. One limitation included the age range of the students, and another limitation was that first through third grade are formative years in which significant growth takes place in emergent readers.

Other studies show strong support for morphological processing occurring not only in the morph-orthographic form in the early stages but also on the morpho-semantic level as well. When both morphemic form and meaning in the early stages of morphological processing occur, a "morphological representation emerges due to the stable correlation between form and meaning among words within the same morphological family" (Tsang & Chen, 2013, p. 224). These findings are important to understanding the wide reach of explicit instruction on morphemes and the longitudinal impact this type of morphemic instruction has on a child's education.

Kieffer and Box (2013) investigated the multiple roles of morphological awareness in reading comprehension for sixth-grade Spanish-speaking language minority learners and their native English-speaking peers. The researchers hypothesized that morphological awareness aided in the development of a strong academic vocabulary and that developed academic vocabulary would positively impact reading comprehension. The researchers also hypothesized that morphological awareness would aid in accurate and fluent word reading, which in turn would allow students to spend more time on the cognition portion of reading comprehension and fewer resources on the decoding portion of reading comprehension. With these two hypotheses in mind, the researchers included a third hypothesis. Kieffer and Box (2013) predicted that morphological awareness could be used to predict reading comprehension beyond the use of vocabulary acquisition and word-reading fluency. They stated, "Most of the research has neglected these indirect contributions of morphological awareness, controlling for the effects of vocabulary or word reading fluency rather than exploring their roles as mediators for the relation

between morphological awareness and reading comprehension" (Kieffer & Box, 2013, p. 169). They further explained, "The study examined the extent to which the relation between morphological awareness and reading comprehension was mediated by knowledge of morphologically complex academic vocabulary and by silent word reading fluency" (Kieffer & Box, 2013, p. 170). The students in the study were assessed on English measures of derivational morphological awareness, morphologically complex academic vocabulary, silent word-reading fluency, and reading comprehension. Kieffer and Box (2013) found that "multiple-group path analysis indicated that morphological awareness made a significant unique contribution to comprehension as well as indirect contribution to comprehension via academic vocabulary and word reading fluency" (p. 168).

Other studies have investigated the connection between morphological awareness and reading comprehension. Carlisle (1995) noted over 20 years ago that there was growing empirical evidence of the relationship between morphological awareness and reading comprehension. More recently, Deacon, Francis, and Tong (2017) determined that over half of the new words that children come across in their reading have more than one morpheme. With that in mind, the researchers evaluated the roles of morphological structure awareness and two related skills, morphological analysis and morphological decoding, in the reading comprehension of children in Grade 3 and Grade 5 (Deacon et al., 2017).

This particular study is relevant because of how the researchers framed the investigation. Up until this point in morphological studies, not many researchers looked at both the morphological decoding and morphological analysis aspects in relation to reading comprehension. Carlisle (2000) examined two dimensions of morphological awareness: morphological structure and morphological analysis. Specifically, morphological structure

awareness is a reader's awareness of the structure of complex words. Complex words contain more than one morpheme, so a reader who is engaging with his or her morphological structure awareness is determining morphemic parts within the structure of the word. Morphological analysis is when a reader derives meaning from a word based on the specific morphemes it contains. Nagy (2007) suggested that morphological analysis facilitates "the interpretation of novel morphologically complex words the student encounters while reading" (p. 64). Carlisle (2000) questioned "how these forms of morphological awareness are related to reading comprehension" (p. 169). Deacon et al. (2017) believed that morphology had the potential to have a more targeted role in reading comprehension than what is captured by general word reading. The researchers considered that "morphological structure awareness might play a role in reading comprehension because it indexes metalinguistic awareness more generally" (Deacon et al., 2017, p. 4) and that morphological awareness, or "children's ability to work out the meanings of morphologically complex words . . . might support reading comprehension" (Deacon et al., 2017, p. 4). These two predictions were the cornerstone of the researchers' study. Deacon et al. (2017) found "the use of morphological structure awareness, morphological decoding and morphological analysis account for 8% of the variance in reading comprehension, after controlling for children's age, phonological awareness, nonverbal reasoning and word reading skill" (p. 1). The 8% variance is much larger than that identified in other studies. The authors attributed this difference to the fact that they looked at both morphological structure awareness and morphological analysis while prior studies appeared to solely focus on morphological structure awareness.

Deacon et al.'s (2017) study also noted that the contribution of each morphological decoding and morphological analysis component was unique to reading comprehension and that

the findings pointed to the effectiveness of developing these skills in children so that they can better understand texts. This particular study could lead future researchers to look at variances such as the age of students, specifically older students, and the use of specific instructional approaches to include morphological structure awareness and morphological analysis when working with students (Deacon et al., 2017).

Another study evaluated four potential intervening variables through which morphological awareness may contribute indirectly to reading comprehension (Levesque et al., 2017). The researchers assessed word reading and vocabulary as well as children's ability to read and analyze the meaning of morphologically complex words. Reading comprehension is a multidimensional skill set that is grounded in language. The aim of this study was to examine the ways in which morphological awareness contributes to reading comprehension in Grade 3 readers. Morphological awareness showed a direct contribution to reading comprehension outside of the four studied variables. Other studies with less restrictive investigations made similar findings (Kieffer & Box, 2013; Kieffer & Lesaux, 2012). The findings that Levesque et al. (2017) presented could inform future research as to the potential mechanisms underlying the relationship between morphological awareness and reading comprehension in children. One finding was that in morphological analysis, "morphological awareness contributed to children's ability to analyze the meaning of unfamiliar derived words, which in turn supported their reading comprehension" (Levesque et al., 2017, p. 16). The study's findings included that morphological awareness contributed directly and indirectly to reading comprehension and morphological decoding and morphological analysis were distinct indirect pathways (Levesque et al., 2017). Further research suggests an association between morphological awareness and reading comprehension even after accounting for factors such as phonological awareness, nonverbal

skills, vocabulary, and word reading (Nagy et al., 2006). In morphological decoding, morphological awareness was shown to have a targeted effect on children's ability to decode unfamiliar complex words (Kuo & Anderson, 2006).

Essential Components of Reading Instruction

Teachers do not often remember how they learned to read unless they had a difficult time, and yet understanding the complex linguistic strains involved is important to their ability to succeed as literacy educators (Birsh, 2011). Literacy acquisition starts early. By the time children reach the age of 10 months, they become able to recognize speech patterns (Moats & Tolman, 2009). "To teach students about words, a teacher must be familiar with the linguistic units that spelling represents—the phoneme-grapheme correspondences, spelling patterns, syllable constructions, and morphemes" (Moats, 2009, p. 72). Secondary teachers are being petitioned to continue explicit reading instruction into the upper grades (Carnegie Council on Advancing Adolescent Literacy, 2010; Torgesen et al., 2007). As a result of this push to provide continued literacy instruction, phonology and morphology have become a necessary linguistic skill set for all teachers because students in both the emergent stages and the highly developed stages will engage in various levels. As Birsh (2011) stated, "From early decoding to increasingly frequent exposure to lengthier, more complex words in the middle and high school years, students' morphological knowledge is an essential component of successful decoding, comprehension, spelling and writing" (p. 65).

Reading does not come easily for many students in the upper grades. Spoken language has been a part of the human experience for thousands of years, but reading and writing are a manmade imposition to the brain. Many people's brains have adapted and developed over time to adjust to these cognitive demands. However, not all brains are hardwired to decode and

encode with ease. There has been an explosion of scientific research in reading education over the last quarter century. Federal and state governments have scrambled over the past decade to define literacy and outline objective literacy benchmarks. McGuinness (2006) pointed out that doing "this put the United States in the unenviable position of being the first nation in the English-speaking world to discover the shocking truth about actual literacy rates, truth which has revealed a 'literacy crisis' in America" (p. 7). Data analysis in education has taken front stage, and as a result, legislation such as the No Child Left Behind Act of 2001 legislation and the Reading First Initiative have taken root. As a result of these legislations, Response to Intervention and the Common Core State Standards (CCSS) were created in an attempt to make a positive impact on literacy education.

In 1997, the U.S. Congress requested that a panel look at the status of educational practices based on research-based knowledge, and the NRP was formed (NRP, 2000). In turn, the NRP was issued the task of determining best practices in reading and what components are vital to the reading process. The panel intensively reviewed phonemic awareness, phonics instruction, fluency, comprehension, teacher education and reading instruction, and computer technology and reading instruction. These findings were originally presented in a report titled *A Nation at Risk* in 1983 and had enormous impact on reading instruction (NRP, 2000).

Following the presentation of findings by NRP, five components of reading were found to be essential to the process of reading: the alphabetic principle, phonemic awareness, oral reading fluency, vocabulary, and comprehension (National Reading Panel, 2000). Fluent readers should demonstrate specific skills when orally reading. A prosodic reader reads the text with correct intonation, phrasing, and pace. The more complete the phonemic decoding is, the more accurate the first attempt will be. If any one of these pieces is missing, then the reader needs to

compensate, and comprehension of the text may be hindered. In sum, the NRP made an impact that is still felt by education today.

Classroom Implications

Students need to know the meaning of many words and be able to use those words in context in order to succeed in the middle and high school content classrooms. Flanigan et al. (2012) shared, "By teaching students how to tap into this deep-rooted system of meaning that underlies most English words, we help them generate a more extensive and deeply grounded vocabulary" (p. 133). The research clearly indicates that mastery of academic language is important for students to access the content in academic texts as well as to have the ability to participate in content classroom discussions (Bailey & Heritage, 2008). As such, academic language needs to be explicitly taught since students are not going to acquire it during daily, informal conversations with their peers. Many of the words that English-speaking students encounter in their textbooks are created from two or more morphemes such as affixes and bases (Nagy & Anderson, 1984). As students read more complex text as they progress through higher grades, they encounter these polymorphemic words more and more frequently (Nagy & Townsend, 2012). As a result, morphological awareness tends to correlate with reading comprehension ability in monolinguists (Carlisle, 2000; Deacon & Kirby, 2004).

Nearly every state in the United States has adopted the CCSS in response to major industry concerns that students are not ready for the workforce when they leave school. The CCSS emphasize vocabulary development within ELA and across content areas for middle grades. CCSS also focuses on academic language (Zwiers, 2007) and students' growing understanding of words with increasingly specific meanings (Wall, 2016). As students move through middle school and then into high school, they are increasingly required to know content-

specific and academic language. These words are not typical of everyday conversation. According to Bintz (2011), "Students thus have an increasing need for vocabulary-based knowledge as part of their overall literacy development as they progress through the middle grades and beyond" (p. 44). While the CCSS have permeated public education in much of the United States, colleges continue to have autonomy in deciding the curriculum they require for preservice teachers. Preservice teachers are not required to take coursework in literacy education, and each state leaves the coursework determination to individual teacher education programs (Lesley, 2014).

Summary

The purpose of language is to communicate. Learning to read is the foundation of learning and academic achievement (Parris, 2005). Emergent readers are explicitly taught phonological awareness to decode basic words but are not often given explicit instruction on morphological awareness even though early findings suggest that morphological processing skills have long-term influence on later reading skills. Secondary students who have difficulty reading often struggle in all content areas, so high-stakes assessments are concerning to both the student and the school system. College and career readiness standards demand high-functioning literacy skills. If secondary students are applying large quantities of cognitive resources to decoding, then there is little left to give attention to comprehension resources. When students are considered to be linguistically incompetent, it becomes difficult for them to compete in the classroom. Therefore, morphology's role in both decoding and fluency may provide valuable insight for essential comprehension instruction for all readers. If providing explicit morphology instruction at the secondary level with secondary content is as effective as providing explicit decoding instruction is at the elementary level, it would be remiss to not include morphology

instruction as a staple in secondary reading instruction. The implications of learning how to best teach morphology, a foundation of a deep orthography such as English, is relevant and missing from current literature.

CHAPTER THREE: METHODS

Overview

The purpose of this study was to evaluate the efficacy of morphological instruction of Latin bases that incorporates word matrices in middle school ELA by comparing classrooms that implement morphological instruction using word matrices with those that do not incorporate word matrices in morphological instruction as measured by MAP achievement scores in overall reading performance, informational text performance, and vocabulary acquisition and use. This study compared the performance growth of seventh-grade students who received morphological instruction with word matrices with the performance of those who did not use word matrices within morphological instruction.

Design

This study used a quasi-experimental, nonequivalent control group. A pretest and posttest design was used to compare the overall reading performance, informational text, and vocabulary acquisition and use performance growth of seventh-grade students participating in the morphology instruction group, which used word matrices, with the performance of those in a curriculum-based instruction group who did not use word matrices to determine the effectiveness of explicit morphology instruction on seventh-grade students. For the purpose of this study, reading performance growth, the dependent variable, was generally defined by the difference between winter and spring composite RIT scores on the MAP. Morphology instruction, the independent variable, was generally defined as instruction presented to teach students the structure and form of words (Carlisle, 2003). Quasi-experimental designs are appropriate for dealing with intact groups when random assignment to treatment groups is not possible, as they do not disrupt the existing research setting (Campbell & Stanley, 1966). Dimitrov and Rumrill

(2003) cited the use of this design "primarily for the purpose of comparing groups and/or measuring change resulting from experimental treatments" (p. 159).

This study used a quantitative research design to explore the practices of traditional vocabulary instruction in comparison with explicit morphology instruction that included word matrices. The participating teachers administered the NWEA MAP assessment in the fall, winter, and spring. The explicit morphology instruction took place during the second semester of the 2017–18 school year, and as such, the data reviewed for this study included the scores from the winter and spring MAP assessment sessions. According to NWEA, the reading MAP overall benchmark norm for seventh-grade students is 218. The benchmark score is the overall reading performance score based on the distribution scores on each subtest and is given an RIT and is then reported as an RIT score. The RIT scores are equal interval data and range from approximately 100 to 300 on the spring MAP test.

The quasi-experimental design was fitting for this study because the it provides a choice of groups with which researchers test a variable with no random selection or preselection process. For example, to conduct an educational experiment, a researcher could use a population by class, by alphabetical arrangement, or by seating arrangement. Population selection in educational settings is often determined by a convenience sampling. Since convenience sampling would be a nonprobability sampling technique in which subjects are selected because of their convenient accessibility and proximity to the researcher, there would be minimal disruption for the population involved. In research, it would be ideal to test the entire population, but in most cases, the population is too large and it is not possible to include all individuals. Population selection in an educational setting is subject to availability and proximity to the researcher and, therefore, selection bias was a threat to the study. Selection bias is a threat

when any factor other than the dependent variable that could lead to posttest differences between groups.

This study used data from a standardized achievement test, MAP, which was administered three times a year by the content teachers in the middle school who participated in this study. Data were used from the academic school year 2017–2018 when morphological instruction was part of the second semester of the school year in one of the two ELA classrooms analyzed for this study. The researcher analyzed the data taken from the winter and spring MAP assessment scores to determine if the morphology instruction had an effect on student scores by comparing scores of students who did and did not receive the morphology instruction.

The researcher used quantitative inquiry as the methodology for this study. Quantitative methods begin with testable theories and hypotheses that aim to explain phenomena (Ary, Jacobs, Razavieh, & Sorensen, 2006). As shared in the research review, some studies exist that pertain to the study of teaching morphology in the classroom; however, further research is necessary focusing on explicit teaching practices of morphology in the classroom. Despite research showing that reading achievement is largely influenced by students' ability to read complex words (Carlisle, 2000), teachers continue to use traditional approaches to teaching vocabulary rather than a word study approach (Fresch, 2003). Chapter Three includes the research question, the methods of the study, and an explanation of the overall research design, data collection methods, and process of data analysis.

Research Question

The research question addressed in the study was as follows:

RQ1: To what extent, if any, is there a difference in overall reading growth performance scores of seventh-grade students who receive morphological vocabulary instruction versus

seventh-grade students who do not receive morphological vocabulary instruction while controlling for prior achievement?

Hypotheses

$N_0$1: There is no significant difference in overall NWEA MAP vocabulary acquisition and use performance scores among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement.

$N_0$2: There is no significant difference in overall NWEA MAP reading informational text scores among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement.

$N_0$3: There is no significant difference in overall NWEA MAP RIT reading performance growth among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement.

Participants and Setting

The participants for the study were drawn from a convenience sample of seventh-grade students who attended a middle school located in the northeastern part of the United States during the spring semester of the 2017–2018 school year. The school selected was a school in the researcher's home school district but was not a school that the researcher actively taught in. The school is a middle-to low-income suburban school. The district contains one elementary school, one middle school, and one high school and represents a landscape of suburban and rural areas. In terms of ethnic diversity, the student population was 93.19% White, 3.38% multiracial,

1.54% Hispanic, 1.2% Black or African American, 0.34% American Indian/Alaskan Native, 0.23% Asian, and 0.11% Native Hawaiian or other Pacific Islander (Pennsylvania Department of Education, 2017). The middle school included fifth through eighth grade, along with additional programs warranted to educate English language learners and students with special needs. The teachers' averaged over a decade of educational experience, and the percent of classes taught by highly qualified teachers was 100%. The district enrolled under 2,000 students, and the geographic size of the district was over 30 square miles. Just over half of students were considered economically disadvantaged, and the special education population was 15.45%.

One principal and one assistant principal are employed in NW Middle School (pseudonym). The principal has a background in special education and was a special education teacher at the school prior to being hired as the building principal. The principal has been an administrator at NW Middle School for 11 years. The assistant principal has an elementary education background and has been an administrator in the building for nine years.

For this study, the number of participants sampled was 120, which exceeds the requirement of 96 for a medium effect size with a statistical power of .7 at the .05 alpha level. The quantitative data involved a convenience factor (Gall, Gall, & Borg, 2007). An entire group of students who share at least one characteristic is called a population (Ravid, 2011). In this study, the population consisted of students who participated in the mandatory seventh-grade ELA class at NW Middle School. The sample came from the sole middle school in the school district. Approximately 120 seventh-grade students attended NW Middle School at the time of the study. The sample consisted of 64 males and 56 females. The students participated in the mandatory general education ELA class based on the curriculum published by Houghton Mifflin Harcourt. Two educators taught these three 90-minute ELA courses a day on a block schedule.

One hundred twenty seventh-grade students participated in this study. The average class size was 21 students. No students were identified as English language learners. The sample contained 56 females and 64 males. The control group receiving the traditional curriculum-based vocabulary instruction that did not include word matrices included 22 females and 38 males and was led by a teacher who had 10 years of teaching experience. The treatment group receiving the explicit morphological instruction that used word matrices included 34 females and 26 males and was led by a teacher who had 15 years of teaching experience.

The treatment group was chosen because the teacher of those classes was able to attend the training about word matrices and the control group's teacher was unable to attend the training due to other commitments. As a result of these circumstances, the students of the teacher who attended the training about word matrices were those in the treatment group and the students of the teacher who was not able to attend the training were those in the control group.

Instrumentation

The researcher used data on the performance growth on overall reading performance, informational text, and vocabulary acquisition as measured by the NWEA MAP assessments. NWEA is a research-based, not-for-profit organization that supports students and educators worldwide. Since 1977, NWEA has developed Pre-K-12 assessments and provided professional learning opportunities. More than half the schools in the Unites States and educators in 145 countries use the NWEA tools (NWEA, 2017). In 2017, the school district began using the NWEA's assessment to measure student growth in the areas of reading and math. The MAP assessment by the NWEA has reliability coefficients that range from .78 to .81 for the reading test aligned to CCSS (NWEA, 2017). The computer-adapted assessment uses RIT Scale to provide a measurement of student academic growth and consists of between 47 and 52 questions.

The reading score is reported as a RIT score. The RIT scores are equal interval data and range from approximately 100 to 300 on the spring reading MAP assessment. In this study, the reading assessment results of the MAP assessment were reviewed. The subcategories within the reading section are reading literature, reading informational text, and vocabulary acquisition and use. A student earns an RIT score in each section, and the three subcategories are averaged together to give an overall reading RIT score.

MAP is a computer adaptive test, which means that every student gets a unique set of questions based on his or her individual responses to previous questions. As the student answers, questions are assigned to the student. If the student incorrectly answers, the questions get easier. If the students correctly answers, the questions become more difficult. The assessment is concluded when students reach a level at which they are getting 50% of the questions correct (NWEA, 2017). For this study, reading growth is defined by improvement in the student's RIT scale score. (NWEA, 2017). Students completed the assessment on district-supplied laptops as part of the district-wide testing battery for Grades 3–12. Score reports were available to classroom teachers and administrators through the online NWEA MAP login for MAP Growth and MAP Skills reports. The school district employee, an elementary school reading specialist, then retrieved the scores. The ELA teachers in the study administered the MAP assessment during the regularly scheduled ELA class time. The assessment was scored by the NWEA assessment software, and results were posted as soon as the student completed the assessment.

NWEA uses anonymous assessment data from over 10.2 million students to create norms, placing students and schools within a representative national sample. The anonymous assessment data create a pool of test records of more than six million test events, 23,000 schools, and 49 states. Since the MAP assessment has reliability coefficients that range from .78 to .81

for the reading test, the researcher found the assessment to be a reliable measure of student growth. Reliability is a measure of consistency within the results and interferences (Ritchie, Lewis, Nicholls, & Ormson, 2013). The assessment's overall reliability is in the low to mid 0.90s, meaning that it has high reliability (NWEA, 2017).

The consistency of an instrument and its repeatability comprise its reliability, whereas validity refers to the instrument's ability to accurately describe a phenomenon's characteristics. Validity refers to how well a specific research method measures what it claims to measure. Ritchie et al. (2013) noted that an instrument's reliability and validity affect the extent to which researchers can use that instrument to learn about phenomenon, as well as the probability that the use of the instrument will provide statistically significant and meaningful findings. An instrument should demonstrate validity in three ways: first, the content of the samples and instruments should be valid; second, the criteria and selection of the instrument should be according to the established standards, relevant and valid; last, the construction of the data should be close enough to the instrument under study. Leedy and Ormrod (2005) further defined the validity of a measurement as "the extent to which the instrument measures what it is supposed to measure" (p. 31).

Procedures

First, the researcher applied to the Liberty University Institutional Review Board and requested permission from the school system to conduct the research. Additionally, the researcher obtained permission from the school district's superintendent as well as the building administrators to conduct research at NW Middle School (see Appendix A). The section below outlines the procedures that the researcher followed throughout the research study.

The researcher met with the principal of the school to describe the study and explain the expectations of the teachers and students. The researcher explained the potential risks and benefits for the school to participate in the study. At this time, the researcher gained permission to speak during the school day with the two seventh-grade ELA teachers. Since the data were pulled after the students left for the summer break, the data were considered archival data. The IRB committee approved the collection of the archival data, and thus consent and assent forms were not needed for data collection. Since the seventh-grade ELA teacher for the control group followed the curriculum protocol for teaching vocabulary via worksheets created by Houghton Mifflin Harcourt publishers, no further training was needed for that teacher.

The teacher implementing the treatment attended a three-hour training on using word matrices to teach bases and affixes given by the researcher as part of the researcher's position as district reading specialist. This training was provided district-wide for third-, fourth-, and fifth-grade teachers as a district initiative to address vocabulary instruction in the classroom. The seventh-grade teacher providing the treatment also participated in the training, while the teacher working with the students in the control group did not participate in the training.

The training provided teacher of the treatment group with instructions on carrying out the treatment. The treatment included teaching the students to read a matrix, which is a tool for exploring and testing knowledge of word structure. Matrices provide a way to explore word families and interrelated words. For the students to be able to use a matrix, the teacher needed to explain that they would read the matrix from left to right, make only single, complete words from a matrix, and only build words that can be used in a sentence. The students were instructed that they do not need to take an element from every column of a matrix; however, the user cannot leapfrog, or skip over, a column.

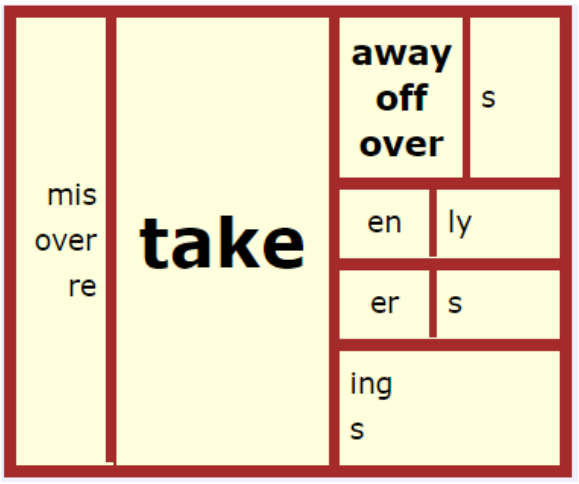

Figure 1. Sample page from language lesson teacher training.

A word matrix was used to create word sums. A word sum shows how a word is built by separating each element by a plus sign (+) at the joins. The arrow (→) represented the phrase "is rewritten as" and showed how the word was rewritten with the spelling conventions applied. The matrix does not contain an equal sign since there are times that a spelling rule replaces a letter, such as the letter *e* in *take* to *taking*, or a letter is needs to be added, as when adding an *n* when changing the word *run* to *running*. Bases were written in bold font. Two bases formed a compound word. Using a matrix, students built words. Teachers placed particular emphasis on the meaning of a base, the meaning prefixes offered, and the part of speech based on a suffix. Students encountered spelling rules as well as learned new words. Below are three examples of word sums using the *take* matrix from above:

1. re + take → retake
2. mis + take + en → mistaken
3. take + over → takeover (compound word)

Matrices and word sums were the main structures utilized as specially designed instruction in the treatment group. The three classes receiving the treatment worked with five

matrices each week in order to learn five new bases each week. In the event that the base was a twin base, or an alternate form, students encountered more than five new bases for that week. An outline of the specific bases covered each week is outlined in Appendix B. As previously explained, the treatment group consisted of three classes that were selected because the teacher was able to attend a district-mandated training, and the control group's teacher was not able to attend the mandated training due to other commitments. As a result of these circumstances, the three classes of students of the teacher who attended the training formed the treatment group, and the three classes of students of the teacher who did not attend the training formed the control group. The treatment group used the word matrix approach to learning vocabulary from February until April. The third and final MAP assessment was administered in May. The month of May contained activities such as a final exam, field trips, and additional end-of-the-year activities such as assemblies that would not otherwise occur. Due to these disruptions to both the treatment and control group, all vocabulary instruction ceased at the end of April. Data collection began in June.

The researcher identified students who participated in the word matrices morphology instruction classes and those who did not. After defining the control group and a treatment group, the researcher gathered the NWEA MAP assessment scores for all students. All data needed for this study were gathered via the secured and encrypted NWEA website. The data were recorded into a spreadsheet that was emailed to the researcher by a district employee and was stored on the researcher's password-protected computer.

Permission to collect, analyze, and report the data was granted from the district. Information was collected through a review of student records. The treatment teacher reported spending approximately 20 minutes on each lesson in the months of February, March, and April

for a total of nine hours of morphology instruction via matrices. The control teacher reported spending 15 to 20 minutes on each vocabulary lesson. The researcher did not have a direct part in the delivery of the morphological instruction that the students received. All student names were removed from the data, and a number was assigned to each student. Data from the study are being kept for three years in a secured area.

Data Analysis

The statistical method used was analysis of covariance (ANCOVA), in which the posttest mean of the experimental group was compared with the posttest mean of the control group with the pretest scores used as a covariate (Gall et al., 2007). ANCOVA is a procedure for determining whether the difference between the mean scores of two or more groups on one or more dependent variables is statistically significant after controlling for initial differences between the groups on one or more extraneous variables. Ary et al. (2006) stated, "Analysis of covariance (ANCOVA) is a statistical technique used to control for the effect of an extraneous variable known to be correlated with dependent variable" (p. 308). The school district adopted a new reading curriculum for the 2017–2018 school year and required the teachers to follow its scope and sequence and all accompanying materials with fidelity from August 2017 through December 2017. Beginning in January 2018, the teacher who worked with the treatment groups was permitted to use the matrix word study approach, and the teacher who did not use the matrix word study approach continued to use the traditional curriculum materials. Both teachers continued to follow the newly adopted curriculum and scope and sequence in all other capacities. When the groups had been classified on several independent variables, ANCOVA was used to determine whether each factor and the interactions between the factors had a statistically significant effect on the dependent variable, after controlling for the extraneous variable (Gall et

al., 2007). For the purpose of this study, the morphology instruction using the word matrices was the independent variable.

The NWEA MAP scores were measured on an interval scale, which is customary for standardized tests in statistical analysis (Gall et al., 2007). Assumption testing for normality of distribution was conducted through the Shapiro-Wilk test. The researcher also accessed boxplots, probability plots, and histograms utilizing this data, allowing her to visually examine the data for extreme outliers, linearity, and normality. To test for the assumption of equal variances, the researcher utilized Levene's test for equality of variances. Upon the completion of all assumption testing, the researcher conducted an independent samples *t* test, based upon academic achievement as measured by the NWEA MAP scores of the participants to determine whether there was a difference between the control group (students who did not receive the word matrix morphology instruction) and the treatment group (students who did receive the word matrix morphology instruction). All data were analyzed at an alpha level of .05. According to Gall et al. (2007), the utilization of the independent samples *t* test is appropriate when analyzing the means of a dependent variable to determine if a significant difference exists between groups.

The purpose of the study was to compare the instructional approach of explicit morphology instruction using word matrices as measured by the nationally normed NWEA MAP assessment in comparison to the traditional approach of teaching vocabulary using only curriculum-based materials. The specific data that were instrumental to this study were the NWEA MAP pretest given to seventh-grade students at NW Middle School in the winter of 2017–2018 school year and the NWEA MAP posttest given in the spring of the same school year. To test the hypothesis, the researcher analyzed the performance growth on the students' MAP test scores using the ANCOVA tests to test whether the treatment group achieved

significant improvement in overall reading performance, informational text, and vocabulary acquisition and use in comparison to the control group.

This possible effect for the initial scores of the norm-based NWEA MAP scores between the experimental and control groups was accounted for by using ANCOVA by including prior intervention scores as a covariate. The researcher created boxplots, probability plots, and histograms utilizing this data to visually examine the data for extreme outliers, linearity, and normality. Using mean scores from the pretest, the covariate, possibly reduces the likelihood of a Type II error (Ary et al., 2006). The researcher used a level of significance of .05 in the ANCOVA analysis. If the value of *F* exceeded the critical value of .05, the researcher rejected the null hypothesis. The researcher conducted further post hoc tests since the ANCOVA did not show significant differences to further investigate the significant statistics.

The researcher reviewed posttest means and determined the effects based on the data. All interpretations of data by the researcher were based on results demonstrated in the statistical analysis. The researcher conducted a Kolmogorov-Smirnov Test, used for samples of more than 50 participants, on both the treatment and control groups to ensure that the assumptions of normality were not violated in addition to examining histograms. The researcher used Levene's test since the ANCOVA assumes that the variances are equal across groups or samples. In addition, the researcher created a series of scatterplots depicting the pretest and posttest variable for each group to look for the classic cigar shape. This ensured that the assumption of bivariate normal distribution was met. The researcher used Levene's test to verify the assumption of homogeneity of variance.

Summary

Examining morphological instruction and its impact on middle school students may reveal factors that predict student reading comprehension achievement and thereby improve the quality of the instruction. The information from this study could also be used by educators to enable them to better understand morphological instruction and who benefits the most.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this quantitative, quasi-experimental, pretest-posttest nonequivalent control group design research was to determine if there is a difference in overall reading growth performance scores of seventh-grade students who receive morphological vocabulary instruction versus seventh-grade students who do not receive morphological vocabulary instruction while controlling for prior achievement. A posttest nonequivalent control group design compared the treatment and control groups' reading scores.

In Chapter Four, the results are presented. This chapter is divided into five sections: (a) sample population and demographic findings, (b) instrumentation and descriptive statistics, (c) assumptions, (d) inferential analyses, and (e) summary. The chapter ends with a summary of the results. These data were analyzed using IBM SPSS Statistics. SPSS was used for all descriptive and inferential analyses. The results from the inferential statistics were determined between groups by using independent samples *t* test with a significance level of $< .05$. Significance of this level means that findings and patterns in data are unlikely to be due to chance. In addition to the Levene's test, two-way analysis of variance (ANOVA) or standard multiple regression analysis were used to examine the data.

Research Question

The research question of this study was as follows:

RQ1: To what extent, if any, is there a difference in overall reading growth performance scores of seventh-grade students who receive morphological vocabulary instruction versus seventh-grade students who do not receive morphological vocabulary instruction while controlling for prior achievement?

Null Hypothesis

The corresponding null hypotheses using ANCOVA and ANOVA procedures included:

$H_0$1: There is no significant difference in overall NWEA MAP vocabulary acquisition and use performance scores among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement.

$H_0$2: There is no significant difference in overall NWEA MAP reading informational text scores among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement.

$H_0$3: There is no significant difference in overall NWEA MAP overall reading performance growth among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement.

Descriptive Statistics

The sample included students from two seventh-grade classrooms in a public middle school located in northwestern Pennsylvania. Data were gathered for the 2017–2018 school year from 120 students. Table 1 shows the overall number of students participating and their division into groups. Fifty-six (47%) females and 64 (53%) males participated. Twenty-two (37%) of the 60 students in the control group were female, and 38 (63%) were male. Thirty-four (57%) of the 60 students in the treatment group were female, and 26 (43%) were male. The data collected on each student included reading MAP test scores, informational text MAP scores, and vocabulary MAP test scores.

Table 1

Between-Subjects Factors

		Value Label	*n*
Student_Group	A	Control	60
	B	Treatment	60

The researcher chose to use ANCOVA to analyze the data because "ANCOVA provides a way to assess whether mean outcome scores differ across treatment groups when a statistical adjustment is made to control for different participant characteristics across groups" (Warner, 2008, p. 613) and provides two-way ANOVAs or standard multiple regression analysis. Descriptive statistics were reported as well as data regarding the testing of the ANCOVA assumptions of normality and equality of variance.

Table 2 illustrates the results of the mean and standard deviations for overall reading growth by method of instruction. The pre-RIT mean was 222.49, and the post-RIT mean was 223.27. The results show a slight increase from the pre-RIT mean to the post-RIT mean. The preinformational text mean was 221.60, and the postinformational text mean was 223.20. The slight increase from the preinformational text mean to the postinformational text mean is larger than the pre-RIT and post-RIT differences. The prevocabulary mean was 223.39, and the postvocabulary mean was 223.55. The difference between the prevocabulary mean and the postvocabulary mean is not significant and does not show the impact of the morphological instruction using matrices versus the traditional vocabulary instruction.

Table 2

Descriptive Statistics

	Minimum	Maximum	Mean	*SD*
pre-RIT	170	250	222.49	14.053
post-RIT	183	256	223.27	15.327
pre-INFO	171	251	221.60	16.012
post-INFO	181	256	223.20	16.077
pre-VOC	181	257	223.39	13.442
post-VOC	185	271	223.55	16.040

Note. $N = 120$

The standard deviation is a "measure of the extent to which the scores in a distribution deviate from their mean" (Gall, Borg, & Gall, 1996, p. 770). A high standard deviation indicates that the values are spread out, and a low standard deviation indicates that most values are very close to the average. Table 3 shows the standard deviation for the post-RIT scores. The post-RIT scores of the control group had a mean of 220.68 and a standard deviation of 13.780. The post-RIT scores of the treatment group had a mean of 225.85 and a standard deviation of 16.442. The standard deviation of the treatment group's overall post-RIT score was slightly higher than the control group's, but it is still not statistically significant.

Table 3

Descriptive Statistics of Post-RIT

Student_Group	Mean	*SD*	*n*
Control	220.68	13.780	60
Treatment	225.85	16.442	60
Total	223.27	15.327	120

The adjusted mean of the control group ($M = 222.640$, $SE = 1.053$) was slightly lower than the adjusted mean of the treatment group ($M = 223.894$, $SE = 1.053$). Table 4 shows the descriptive statistics for the adjusted means of the study variables. After adjusting for pre-RIT

scores, it was found that there was not a statistically significant difference in the control and treatment groups after instruction.

Table 4

Descriptive Statistics for the Adjusted Means of Post-RIT scores

			95% CI	
Student_Group	Mean	Std. Error	Lower Bound	Upper Bound
Control	222.640[a]	1.053	220.554	224.725
Treatment	223.894[a]	1.053	221.808	225.979

[a]Covariates appearing in the model are evaluated at the following value: pre-RIT = 222.49.

Table 5 shows the standard deviation for the postinformational text scores. The postinformational text score of the control group had a mean of 221.02 and a standard deviation of 13.797. The postinformational text score of the treatment group had a mean of 226.63 and a standard deviation of 16.298. The standard deviation on the postinformational text test was slightly higher for the treatment group than the control group, but is still not statistically significant.

Table 5

Descriptive Statistics of Post-INFO

Student_Group	Mean	*SD*	*n*
Control	221.02	13.797	60
Treatment	225.38	17.924	60
Total	223.20	16.077	120

Table 6 shows the standard deviation for the postvocabulary scores. The postvocabulary score of the control group had a mean of 220.47 and a standard deviation of 15.295. The postvocabulary score of the treatment group had a mean of 226.63 and a standard deviation of 16.298. The standard deviation on the postvocabulary test was slightly higher for the treatment group than the control group, but is still not statistically significant.

Table 6

Descriptive Statistics of Post-VOC

Student_Group	Mean	*SD*	*n*
Control	220.47	15.295	60
Treatment	226.63	16.298	60
Total	223.55	16.040	120

Results

Data Screening

To determine if there was a statistically significant difference between the mean score on the vocabulary acquisition portion of the MAP test for students receiving intervention and for students who did not receive the morphological instruction using word matrices, a one-way ANCOVA was conducted. Data screening was conducted on the postvocabulary scores, the postinformational test scores, and the post-RIT scores to determine if there were any data inconsistencies or outliers. No data errors or inconsistencies were found.

Assumptions

The Kolmogorov-Smirnov test was used to examine normality since the sample size was over 50. The assumption of normality was met at the .05 level. The independent variable was the instruction that the students received. Vocabulary scores on the spring MAP test served as the dependent variable, and the winter MAP test scores served as the covariate. The researcher considered the results of the analyses significant if $p < .05$. Before conducting the ANCOVA, the data were tested for equality of error variances and for normality to determine if they met the assumptions of ANCOVA. The histograms depicted in Figures 1–3 suggest that the MAP scores of control and treatment students during the spring posttest follow normal distribution reasonably well. The normal curve that the data followed on the histogram fits the hypothetical standard bell-shaped distribution rather closely.

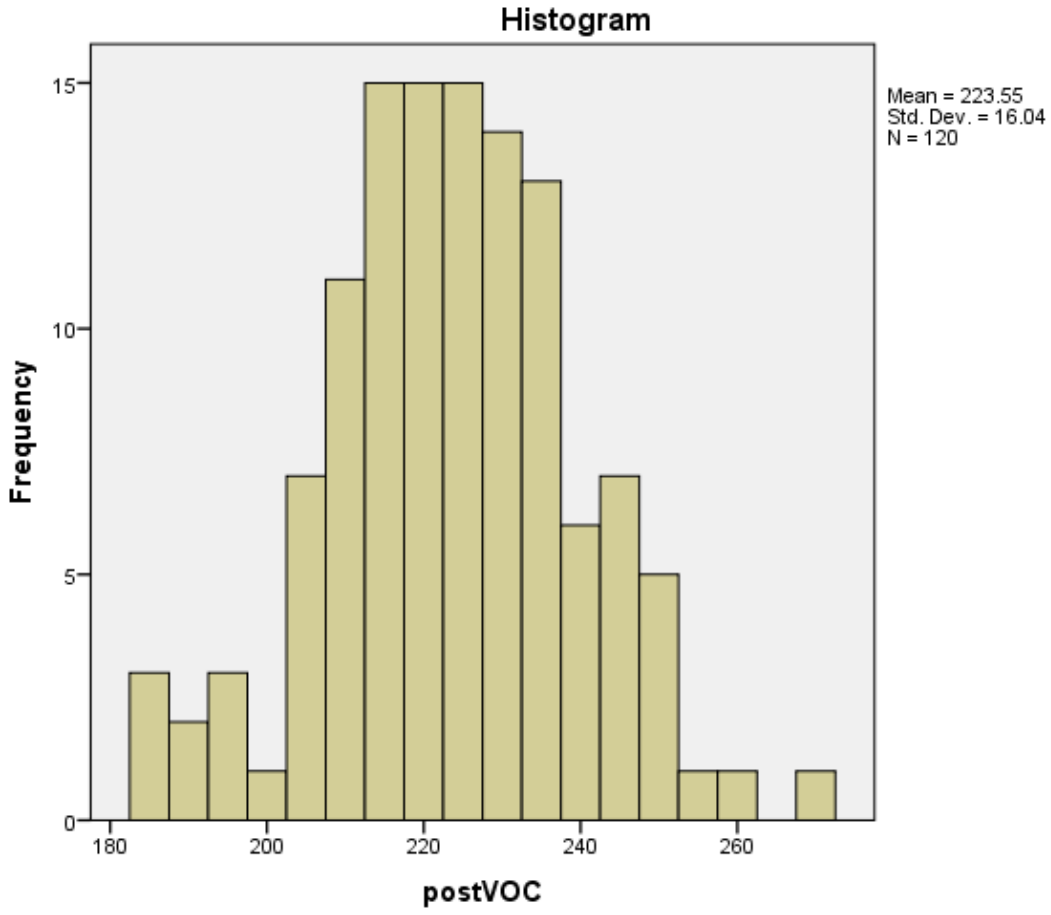

Figure 2. Histogram for pre- and postvocabulary MAP scores.

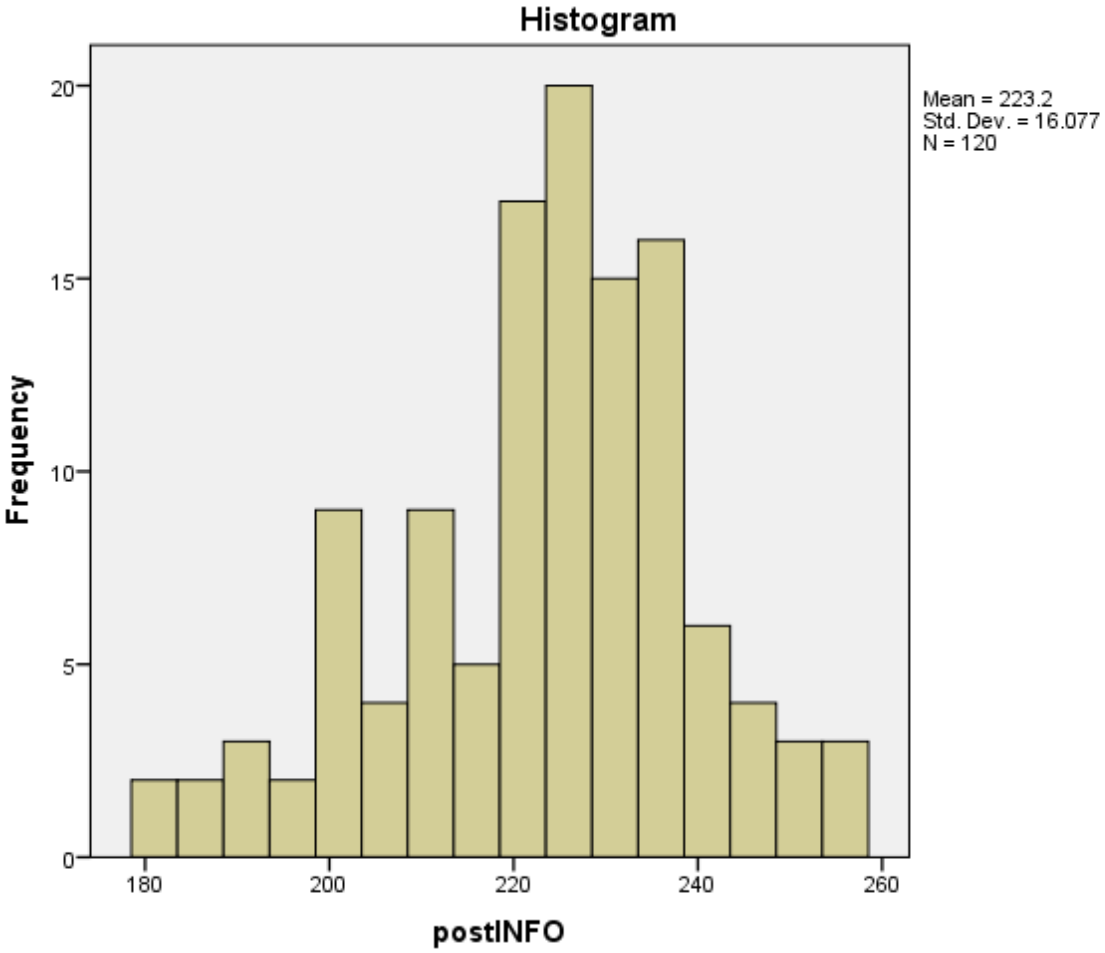

Figure 3. Histogram for pre- and postinformational text MAP scores.

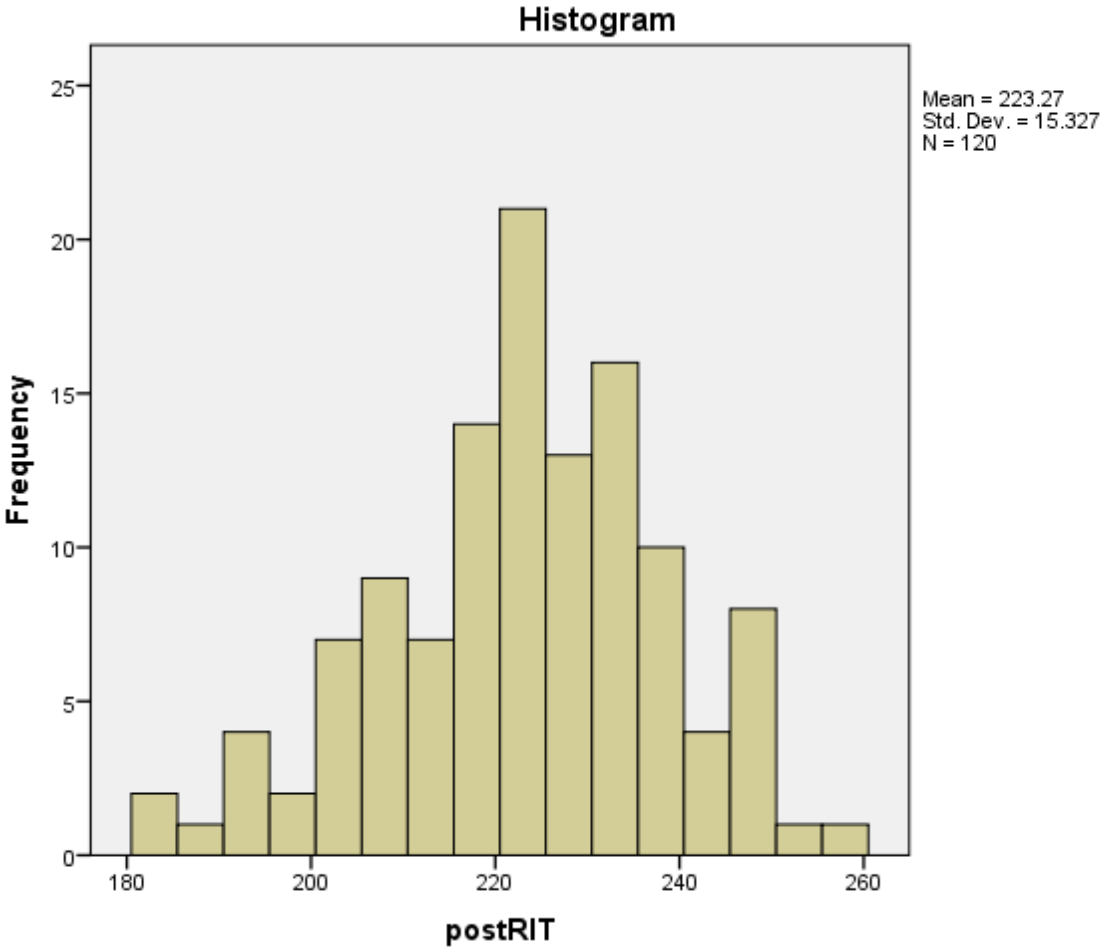

Figure 4. Histogram for pre- and post-RIT MAP scores.

An inferential test of normality using the Kolmogorov-Smirnov test confirmed the test of normality. The *p*-value is associated with the hypothesis that the data follows normal distribution for MAP scores during spring. The independent variable was the instruction that the students received. The scores on the spring MAP test served as the dependent variable, and the winter MAP test scores served as the covariate. Based on the results, the assumption of normality was met.

Table 7

Kolmogorov-Smirnov[a] Tests of Normality

	Statistic	*df*	Sig.
Post-VOC	.041	120	.200*
Post-INFO	.097	120	.008
Post-RIT	.082	120	.045

[a]Lilliefors significance correction
*This is a lower bound of the true significance.

Scatterplots were used to analyze the assumption of bivariate linearity to identify any outliers. The scatterplots were run between the pretest and posttest variables for each group with the data split to determine if the assumption of linearity was met. Linearity of the relationship between pretest and posttest scores, one of the assumptions underlying the ANCOVA, was assessed from the scatterplots depicted in Figures 4–6. The dependent variable, the MAP scores during the winter and after the treatment, was taken on the Y-axis, and the MAP score during the spring, the co-variable, was taken along the X-axis. The cigar-like shape of the scatterplot confirmed the assumption of bivariate linearity, as present in Figures 4–6.

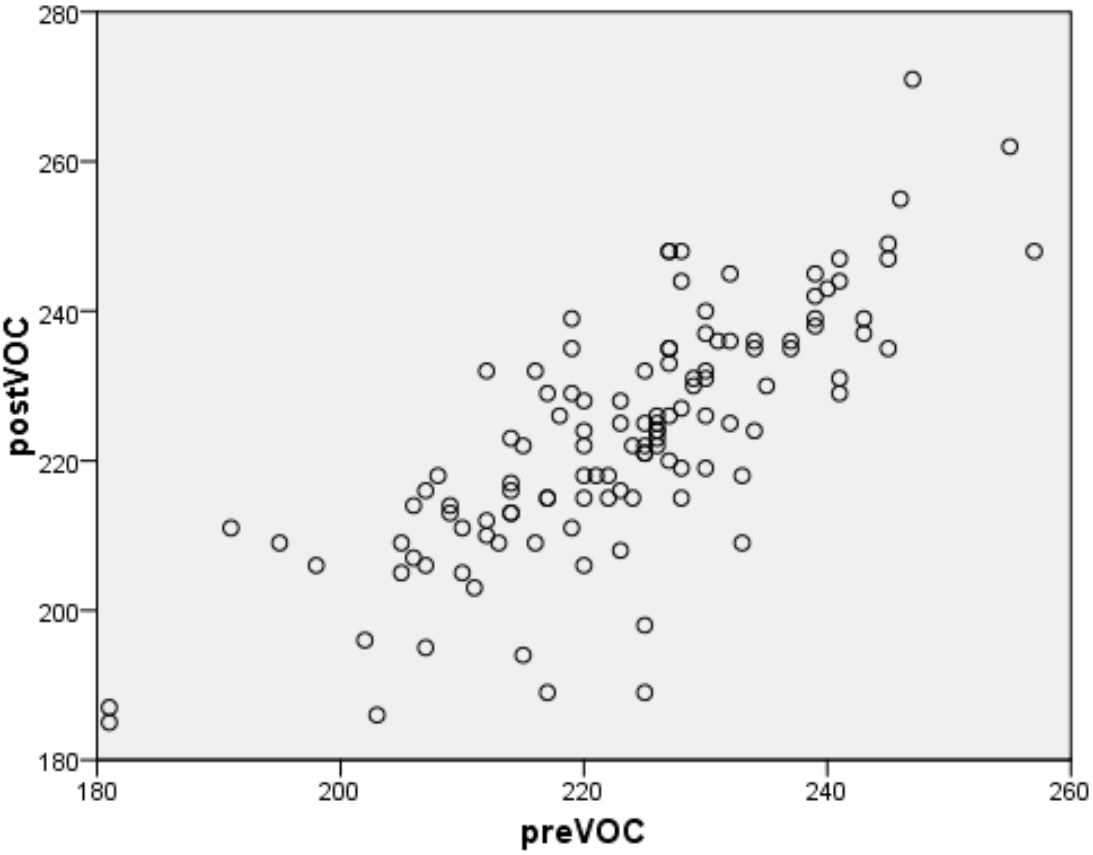

Figure 5. Scatterplot for pre- and postvocabulary MAP scores.

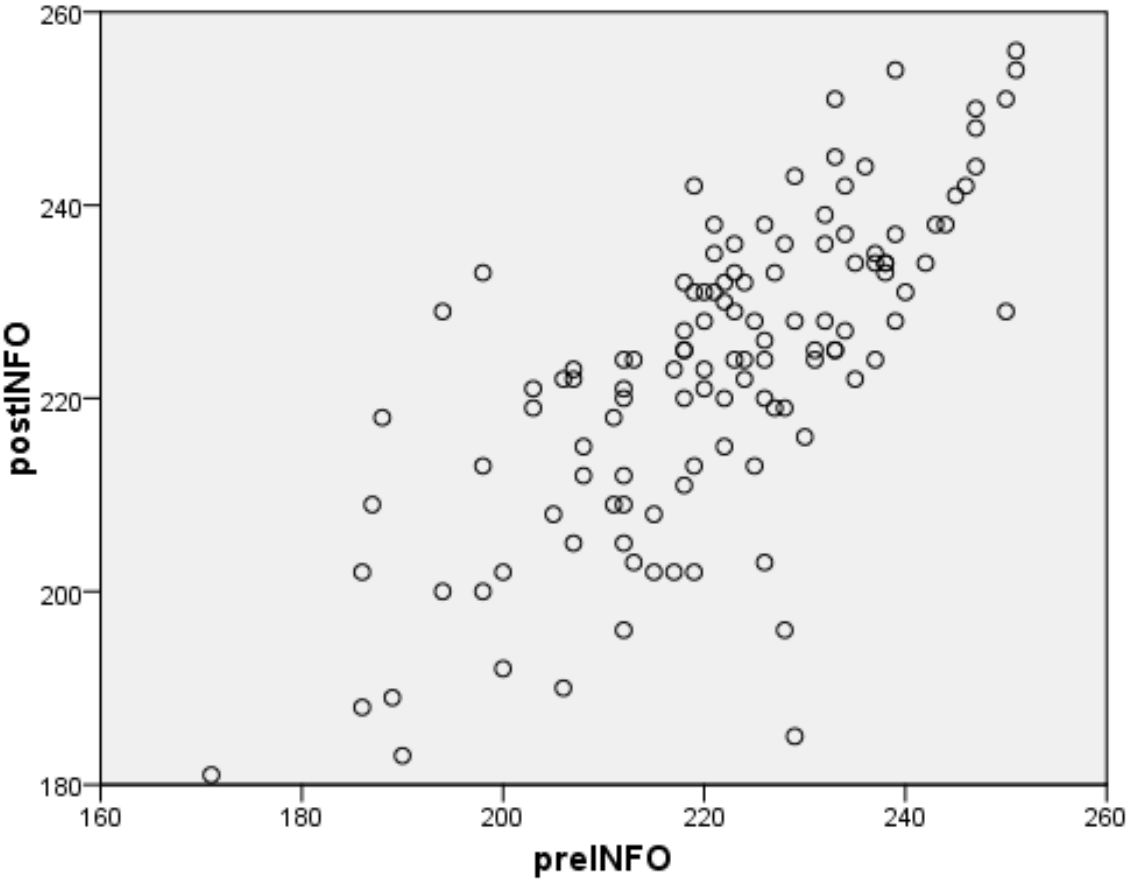

Figure 6. Scatterplot for pre- and postinformational text MAP scores.

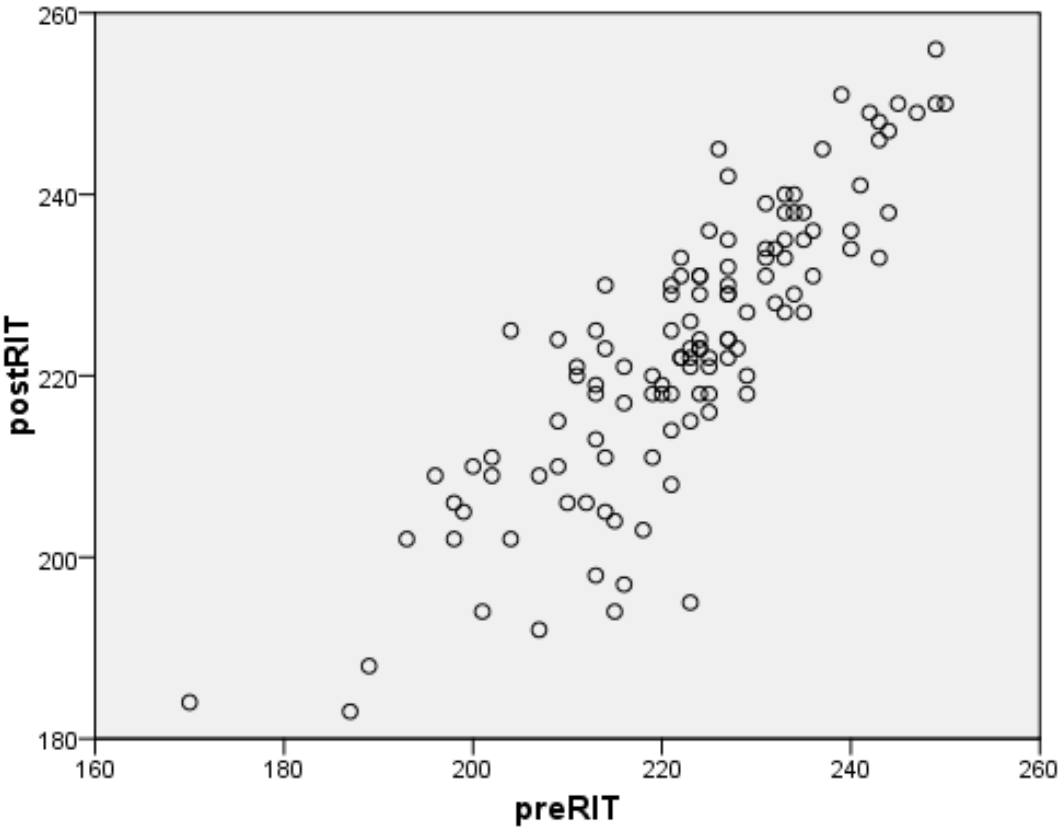

Figure 7. Scatterplot for pre- and post-RIT MAP scores.

Interaction between the posttest vocabulary scores and the instruction was examined by the researcher testing for the assumption of homogeneity of slopes. The tests of between-subject effects, $F(1, 117) = 1.493$, $p = .224$, demonstrated that the assumption of homogeneity of slopes was met. Interaction between the postinformational text scores and the instruction was examined by the researcher by testing for the assumption of homogeneity of slopes. The tests of between-subject effects, $F(1, 117) = .440$, $p = .509$, demonstrated that the assumption of homogeneity of slopes was met. Interaction between the post-RIT scores and the instruction was examined by the researcher by testing for the assumption of homogeneity of slopes. The tests of between-

subject effects, $F(1, 117) = .701$, $p = .404$, demonstrated that the assumption of homogeneity of slopes was met.

Levene's test for equality of variance was run to verify the assumption of homogeneity of variance, and equal variances were not assumed ($p < .05$). An independent-sample was conducted to test the null hypothesis that the error variance of the dependent variable was equal across groups. The Prob>*F* is the *p*-value with the *F*-statistic. It is used in testing the null hypothesis that all of the model coefficients are 0. There was not a significant difference at the $p < .05$ level in scores Prob > $F = .123$, Prob > $F = 1.031$. and Prob > $F = 0.067$. Thus, the assumption was met.

Table 8

Levene's Test of Equality of Error Variances

	F	*df1*	*df2*	*Sig.*
PostVOC	0.123	1	118	.727
PostINFO	1.031	1	118	.312
Post-RIT	0.067	1	118	.796

Results for Null Hypothesis One

Null hypothesis one stated, "There is no significant difference in overall NWEA MAP vocabulary acquisition and use performance scores among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement."

The researcher conducted an ANCOVA to examine the effects of morphological instruction using word matrices versus curriculum-based vocabulary instruction. The researcher considered the results of the analysis significant if $p < .05$. Prior to conducting the ANCOVA, equality of error variances and tests for normality were conducted on the study variables to

determine if they met the assumptions of the ANCOVA. The results for the Levene's test for equality of variances indicated that the variances were equal. The Kolmogorov-Smirnov test indicated that residuals were normally distributed.

A one-way ANCOVA was conducted to test the null hypothesis that there is no significant difference between the scores of students who received the morphological instruction with matrices and the scores of those who received the traditional vocabulary instruction while controlling for pretest vocabulary MAP scores. This result failed to reject the null hypothesis at 95% confidence. The analysis was conducted on 120 participants' data without any of the outliers being removed. The effect size was medium. There is no significant difference between the scores of students who received the morphological instruction with matrices and the scores of those who received the traditional vocabulary instruction

Table 9

Summary of the ACOVA Results on Post-VOC Scores

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
Corrected model	18477.748[a]	2	9238.874	89.055	.000	.604
Intercept	173.923	1	173.923	1.676	.198	.014
Pre-VOC	17336.915	1	17336.915	167.114	.000	.588
Student_Group	154.898	1	154.898	1.493	.224	.013
Error	12137.952	117	103.743			
Total	6027568.000	120				
Corrected Total	30615.700	119				

a. R Squared = .604 (Adjusted R Squared = .597)

Results for Null Hypothesis Two

Null hypothesis two stated, "There is no significant difference in overall NWEA MAP reading informational text scores among seventh-grade students taught with morphology

instruction using word matrices or curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement."

The researcher carried out an ANCOVA to examine the effects of morphological instruction using word matrices versus curriculum-based vocabulary instruction. The researcher considered the results of the analysis significant if $p < .05$. Prior to conducting the ANCOVA, equality of error variances and tests for normality were conducted on the study variables to determine if they met the assumptions of the ANCOVA. The results for the Levene's test for equality of variances indicated that the variances were equal. The Kolmogorov-Smirnov test indicated that residuals were normally distributed.

A one-way ANCOVA was conducted to test the null hypothesis that there is no significant difference among the scores of students who received the morphological instruction with matrices and those who received the traditional vocabulary instruction while controlling for pretest informational text MAP scores. This result failed to reject the null hypothesis at 95% confidence. The analysis was conducted on 120 participants' data without any of the outliers being removed. The effect size was medium. There is no significant difference among the depression scores of students who received the morphological instruction with matrices and those who received the traditional vocabulary instruction.

Table 10

Summary of the ANCOVA Results on Post-INFO Scores

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
Corrected Model	16128.497[a]	2	8064.249	64.498	.000	.524
Intercept	2457.100	1	2457.100	19.652	.000	.144
preINFO	15556.464	1	15556.464	124.420	.000	.515
Student_Group	54.994	1	54.994	0.440	.509	.004
Error	14628.703	117	125.032			
Total	6008946.000	120				
Corrected Total	30757.200	119				

[a]R^2 = .524 (adjusted R^2 = .516).

Results for Null Hypothesis Three

Null hypothesis three stated, "There is no significant difference in overall NWEA MAP overall reading performance growth among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement."

The researcher carried out an ANCOVA to examine the effects of morphological instruction using word matrices versus curriculum-based vocabulary instruction. The researcher considered the results of the analysis significant if $p < .05$. Prior to conducting the ANCOVA, equality of error variances and tests for normality were conducted on the study variables to determine if they met the assumptions of the ANCOVA. The results for the Levene's test for equality of variances indicated that the variances were equal. The Kolmogorov-Smirnov test indicated that residuals were normally distributed.

A one-way ANCOVA was conducted to test the null hypothesis that there is no significant difference among the scores of students who received the morphological instruction with matrices and those who received the traditional vocabulary instruction while controlling for pretest RIT MAP scores. This result failed to reject the null hypothesis at 95% confidence. The

analysis was conducted on 120 participants' data without any of the outliers being removed. The effect size was medium. There is no significant difference among the depression scores of students who received the morphological instruction with matrices and those who received the traditional vocabulary instruction.

Table 11

Summary of the ANCOVA Results on Post-RIT Scores

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
Corrected model	20258.443[a]	2	10129.221	154.011	.000	.725
Intercept	157.061	1	157.061	2.388	.125	.020
preRIT	19457.609	1	19457.609	295.846	.000	.717
Student_Group	46.093	1	46.093	0.701	.404	.006
Error	7695.024	117	65.769			
Total	6009714.000	120				
Corrected Total	27953.467	119				

[a] $R^2 = .725$ (adjusted $R^2 = .720$)

CHAPTER FIVE: CONCLUSIONS

Overview

Chapter Five will review the findings from this quasi-experimental, pretest-posttest, nonequivalent control group and posttest-only non-equivalent control group study. This chapter will review the methodology and provide a summary of these results of the ANCOVA. Connections from current research to results found in this study will be discussed. An outline of the assumptions and limitations as well as possible implications for further research are also provided.

Discussion

The purpose of this quasi-experimental, pretest-posttest, non-equivalent control group and posttest only non-equivalent control group study was to address a gap in the literature by examining morphology instruction using word matrices and vocabulary, informational text, and overall RIT scores of seventh-grade students on the NWEA MAP assessment. This study included a current review of literature regarding reading comprehension, orthography, vocabulary, and morphology. The review of literature determined that there was a lack of research that focused on reading instruction that included morphology. The researcher questioned whether teaching students using word matrices in place of curriculum-based vocabulary instruction would impact students' vocabulary, informational text, and/or overall RIT scores on the NWEA MAP assessment.

An ANCOVA was used to test the null hypotheses for the research question: To what extent, if any, is there a difference in overall reading growth performance scores of seventh-grade students who receive morphological vocabulary instruction versus seventh-grade students who do not receive morphological vocabulary instruction while controlling for prior

achievement? The researcher hypothesized that statistically significant differences would exist in overall reading RIT scores, information text RIT scores, and/or vocabulary RIT scores. The research question was reduced to three hypotheses to determine the possible sensitivity of the instruction and the type of assessment given. Results indicated that a statistically significant difference for all three components as described above did not occur during this study.

Null Hypothesis One

The null hypothesis stated that there is no significant difference in overall NWEA MAP vocabulary acquisition and use performance scores among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement. The ANCOVA confirmed that there was no statistical difference between the scores those who received morphology instruction using word matrices versus those who received curriculum-based morphology instruction, and, therefore, the null hypothesis failed to be rejected.

This study aligned with the knowledge provided by current research that morphology instruction is important to literacy development (Birsh, 2011). Wright and Cervetti (2016) conducted a meta-analysis of vocabulary instruction that impacts text comprehension. The authors of the meta-analysis reviewed the concept that suggests students should be explicitly taught specific academic words that occur with a high frequency in academic reading. However, many researchers question whether it is feasible to explicitly teach the incredible number of words that would need to be covered in order to be effective. Despite the conversations among leading vocabulary researchers, the path to effective vocabulary instruction continued to be murky at best, and nothing has been pinpointed to demonstrate vocabulary instruction that broadly impacts students' reading comprehension.

The NRP (2000) examined the impact of vocabulary instruction on comprehension. Through a qualitative review, the authors concluded that vocabulary instruction can impact comprehension. The researchers with the NRP (2000) were not able to give conclusive evidence of what specific instructional characteristics make vocabulary instruction effective. It is with this knowledge in mind that the researcher attempted to discern if a specific type of vocabulary instruction positively impacted reading comprehension of seventh-grade students. This study added to the body of research that shows vocabulary instruction is important and how that instruction is delivered may make a difference.

Null Hypothesis Two

The second null hypothesis stated that there is no significant difference in overall NWEA MAP reading informational text scores among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement. While students who received the morphology instruction using word matrices scored slightly more highly than students who received curriculum-based instruction, the difference was not statistically significant; therefore, the null hypothesis failed to be rejected.

Strategies such as identifying roots, or bases, and affixes to determine the meaning of words in informational texts help students to read challenging texts. The CCSS have "prioritized integrating vocabulary and academic language instruction within reading texts" (Goodwin & Perkins, 2015, p. 510). Nagy and Townsend (2012) supported the idea that teaching morphology alongside academic language can support students in reading challenging texts. The study undertaken by the researcher attempted to address effective ways to provide the explicit vocabulary instruction that would support Nagy and Townsend's (2012) claim. While the study

did not find significant support for teaching students with word matrices and word sums, the study also did not discredit the use of word matrices and word sums as an effective instructional practice. Nagy and Anderson (1984) pointed out that students need to learn up to 20 to 30 words a day to have the academic lexicon they need in order navigate informational text. Teaching students many new words simply by adding affixes to a single base can help them meet this lexical demand. In fact, Goodwin and Perkins (2015) supported teaching students academic language via morphology in order to aid comprehension. Matrices have the potential to help students to tackle this challenge, as Nagy and Anderson (1984) pointed out that morphological problem-solving can help readers comprehend text because 60% of words can be figured out by using known bases and affixes.

Null Hypothesis Three

The third null hypothesis stated there was no significant difference in overall NWEA MAP overall reading performance growth among seventh-grade students taught with morphology instruction using word matrices versus curriculum-based vocabulary instruction that does not include word matrices while controlling for prior achievement. After controlling for prior achievement, there was not a statistically significant deference in posttest scores in those who received morphology instruction using word matrices and those students who received curriculum-based morphology instruction.

There is current research that suggests that teaching students vocabulary through a morphological approach will lead to improved comprehension scores. Townsend (2015) explained one such study, the Developing Content Area Academic Language (DCAAL), where a group of master teachers and university researchers found that there are many opportunities while teaching lessons in the content area to support students' academic language development.

In this study, students were given pre- and posttests to measure academic word knowledge. The students' responses on the assessments were coded to identify developing knowledge of morphology with relation to academic words. Paired *t* tests were used to examine pre-post differences, and all students made statistically significant gains on the assessments. Results revealed that students who were in classes of more than one participating DCAAL teacher each day made greater gains in academic language and specifically in their ability to generate morphologically complex academic words (Townsend, 2015). These results coincide with the current study when looking at effective vocabulary instruction via morphological approaches in that the DCAAL study revealed that teachers who use a morphological approach in instruction show positive student results, and the current research study adds to the conversation on how teachers might implement effective morphological instruction within their classrooms.

Implications

The study contributes to the body of research regarding the practice of explicitly teaching vocabulary through the use of word matrices and word sums. Previous studies investigated if morphology instruction was helpful for learning academic vocabulary, and while that body of research has become more robust in recent years, the research has not yet determined the most effective ways to teach students through the morphological lens. This study provides a starting point for narrowing down specific approaches to teaching vocabulary to students through morphology instruction. The key is to determine effective vocabulary instructional practices that produce the most gains in student learning.

Even though this study did not produce statistically significant results, students who received morphology instruction using word matrices tended to perform better on the NWEA MAP assessment than students who received traditional curriculum-based morphology

instruction. This study's results have several implications. Instruction regarding grapheme-phoneme correspondence is primarily focused on elementary education, leaving secondary education students and teachers without instructional support. Schools identify struggling readers at every level, from kindergarten to twelfth grade. Secondary ELA teachers must have the knowledge of how to teach the basics of reading in order to support their readers.

The training also made it evident that most teachers had only a very basic understanding of morphology, which included some prefixes and suffixes. As a result of the combined lack of knowledge of phonics and morphology, many teachers revert to having students memorizing lists of words. Explicit instruction was not evident, and thus struggling readers continue to struggle from one grade to the next.

While the study did not reach a clear conclusion that matrices helped students, the study did not indicate that they matrices harmed or stunted the students' learning in any way. One consideration that is worth reviewing is that perhaps it does not matter what type of explicit instructional practice the teacher uses, but rather that the impact comes from the instruction being explicit. Just as there are many graphic organizers from which writers can choose to use to prewrite and organize their ideas in order to draft a written piece, perhaps learners simply benefit from being taught vocabulary in an explicit manner.

Limitations

The first limitation to the study was the participants were all from the same school. Therefore, the results cannot be generalized to represent students from other geographical areas. The participants in this study were intentionally chosen to assess morphological instruction using matrices in order to address a gap in the literature. As a result, the findings may include cultural and socioeconomic bias.

A second limitation was the amount of end-of-the-year testing the students participated in. There is a possibility that the students exhibited testing fatigue due to the numerous assessments they were given within a short amount of time. Testing fatigue would impact the students' overall efforts and, in turn, their scores.

Another limitation was there were two teachers involved in the research study. Individual differences in teaching styles may have made a difference in student learning. A larger study including several teachers from various school districts would help eliminate this possible interference.

A final limitation was the amount of instructional time that the treatment group was given to learn the bases via matrices. The treatment group worked with 41 bases over 27 lessons. Each lesson was approximately 20 minutes in length for a total nine hours of instruction from February to April. The limited amount of time spent by the treatment group may have contributed to a lack of transference by the time the students took the spring NWEA MAP assessment.

Recommendations for Future Research

Based on the results of the study, the researcher suggests that several areas be considered for future research. The duration and frequency of the explicit morphology instruction using matrices are areas to further explore. The students in this study had a limited time of exposure to the instruction. The treatment duration was from February through April. Over the three-month span, 27 lessons covering 41 bases were covered in the treatment group. Each lesson took approximately twenty minutes. A future study may want to look at an entire school year of instruction, the number of bases covered, and a longer duration for each lesson.

The current study also did not include ongoing formative assessment to determine if the students were making gains or retaining information. When students know that they will be tested, they are often more invested in the learning process. The students in the treatment group learned a new base nearly every day for eight weeks. Further research should look at having students work with one base for a week or two weeks with review activities.

Another consideration for future research is to determine if the teachers' prior knowledge of phonics and morphology makes a difference in student outcomes. To determine this outcome, more classrooms and more schools would need to be included in the research. Teacher preparation programs would benefit from knowing what best practices they need to provide for preservice teachers as well as what content knowledge their preservice teachers need.

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Appendix A: IRB Approval

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

June 1, 2018

Erin Pizzo
IRB Application 3353: The Effect of Morphology Instruction on Performance Growth of Seventh Grade Students: A Quasi-Experimental Study

Dear Erin Pizzo,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because it will not involve the collection of identifiable, private information.

Please note that this decision only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

If you have any questions about this determination or need assistance in identifying whether possible changes to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

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Appendix B: School Permission Request

April 4, 2018

[Name]
Superintendent
[School District]
[Address 1]
[Address 2]

Dr. [redacted],

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctorate degree. The title of my research project is The Effect of Morphology Instruction on Performance Growth of Seventh Grade Students: A Quasi-Experimental Study and the purpose of my research is to evaluate the efficacy of morphological instruction that incorporates word matrices as a predictor of reading growth performance of seventh grade students.

I am writing to request your permission to conduct my research at [redacted].

Participants will be asked to participate in learning Latin bases through word matrices in their regular English Language Arts class. Data will be collected via the NWEA MAP assessments during the district assessment schedule.

Thank you for considering my request. If you choose to grant permission, please provide a signed statement on official letterhead indicating your approval.

Sincerely,

Erin Pizzo
Doctoral Candidate

Appendix C: District Permission

April 22, 2018

Liberty University
1971 University Blvd
Lynchburg, VA 24515

RE: Erin Pizzo Research Project

To whom it may concern:

Your graduate student, Erin Pizzo, has requested permission to conduct a research project, as part of her requirements for a doctorate degree, at our Mrs. Pizzo's project is entitled, "The Effect of Morphology Instruction on Performance Growth of Seventh Grade Students."

As Superintendent of the I hereby grant Erin Pizzo approval to conduct this research project with the seventh grade students in our middle school.

Sincerely,

Superintendent

C: , Principal