2008

The effect of instruction in orthographic conventions and morphological features on the reading fluency and comprehension skills of high-school freshmen

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THE EFFECT OF INSTRUCTION IN ORTHOGRAPHIC CONVENTIONS AND MORPHOLOGICAL FEATURES ON THE READING FLUENCY AND COMPREHENSION SKILLS OF HIGH-SCHOOL FRESHMEN

A Dissertation
Presented to
The Faculty of the School of Education
Learning and Instruction Department

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

By
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San Francisco, California
April 2008

This dissertation, written under the direction of the candidate's dissertation committee and approved by the members of the committee, has been presented to and accepted by the Faculty of the School of Education in partial fulfillment of the requirements for the degree of Doctor of Education. The content and research methodologies presented in this work represent the work of the candidate alone.

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Dedication

To Michael Frank, Peggy Koshland, Ashleigh Tighe, and Ilja Van Laar.

Acknowledgements

I would like to acknowledge the University of San Francisco for supporting me throughout the duration of my doctoral studies, as well as my growth as a teacher educator. I am grateful for the guidance and opportunities that have been provided for me by the university. I hope that my future endeavors will allow me to provide guidance and opportunities for others in turn.

I would like to acknowledge the scholarship, mentorship, and kindness of my dissertation committee: Dr. Mathew Mitchell, my chair and guidance who gently nudged me in the right direction; Dr. Lanna Andrews for her ideas, editorial contributions, support, encouragement, and for believing in me; and Dr. Caryl Hodges for her ideas and contributions toward the development of my dissertation.

I also appreciate the professional and editorial support, as well as encouragement from Dr. Susan Evans. Crucial, however, was the encouragement of Dr. Jennifer Madigan, without whom, I would not be here today. It was she who told me about the program at USF, introduced me to Dr. Evans, and bent over backwards to help me prepare my admissions materials in time. I am grateful.

I am thankful for the dedication, scholarship and guidance of the faculty of the Learning and Instruction Department: Dr. Patricia Busk for her guidance in the proposal writing process; Dr. Robert Burns for his encouragement, support, and clear explanations regarding educational research; and Dr. Yvonne Bui for her contributions to my growth as a teacher-educator.

I would like to express my appreciation to my fellow students, who contributed their expertise, energy, and support throughout my doctoral studies, in particular: Peggy Koshland who read draft after draft; Gail Kirby who taught me much about teaching, relationships, and myself, Gwen Essex, my constant companion through nearly every class and break in-between; my fellow special educators Janet Spybrook and Colleen Checho; and the wonderful nurses in our group, Dina Silverthorne, Anna Kwong, Danette Dutra, Renee Grenados, and Shana Guttenberg. I could not have had a more supportive cohort.

I would like to extend my love and appreciation to my close friends and family outside of the USF community, especially: Michael Frank for his love, patience, meals, extra cleaning, encouragement, and for calming me and reading drafts when I needed him to; Ilja Van Laar, who's encouraged me and supported me so much; Ashleigh Tighe, a wonderful English teacher and friend who not only opened her class to me, but read a draft of my proposal; Paul Pinza and the rest of the Westmont Speech & Debate team who make me smile.

Most importantly, I would like to thank Shannon Helkyard for his statistical help. One last important thank you goes out to the administration of Westmont High School for their support and encouragement of my research, as well as Erin Angell and Laura Pina, two fantastic English teachers, and their students and their parents for their participation.

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INTRODUCTION

Statement of the Problem

There is ample evidence in publicly-available school records that primary and secondary students are not gaining the English skills they need from their education in order to succeed in higher education or the workforce. In California, despite having had a minimum of eight years of English Language Arts instruction before reaching secondary school, the highest percentage of any high-school class that has scored at the proficient level or higher in English Language Arts since the California State Tests (CST) were first administered in 2001 is 44%, which was achieved by the freshman class of 2006 (California Department of Education [CDE], 2006a). Additionally, since the second year that the test was administered, the percentage of students scoring at the proficient level or higher has decreased from the freshman to the junior classes. Proficient is defined as attaining a score of a 4 or higher on a 5-point scale on a standardized test of English Language Arts that is divided into two sections: reading and writing. If this is an accurate reflection of students' skills, high-school students in California are not able to keep up with the increasing demands of high-school English requirements.

The goal of improving English skills has become increasingly important for educators in public schools. Teachers and administrators are under pressure to increase students' skills in English as a result of the high-stakes testing demands and the mandate by No Child Left Behind (NCLB) that all students reach proficiency levels by the year 2014 in reading and mathematics (Paige, 2002) as well as increasing demands in the workforce. In today's increasingly heterogeneous classrooms, high-school English

teachers are required to teach an increasing number of standards as well as help their struggling students reach proficiency levels, challenge their advanced students, prepare for and measure regular benchmarks, and teach the literature and creative writing that motivated them to teach English in the first place. The problem is that most high-school English teachers are not trained to teach reading (Mather, Bos, & Babur, 2001; Trelase, 2001). Too often high-school English teachers assume that their students already have mastered low-level literacy skills (Chandler, 2000). High-school English teachers need an awareness of the English skill deficiencies of their students and interventions that can easily be incorporated into their daily routine that contribute to the improvement of their students' literacy skills. The current study will inform educators about the connection between spelling and reading and proposes an efficient intervention for improving students' literacy skills.

Purpose

This quasi-experimental study was designed to investigate the effect of spelling instruction focusing on orthographic conventions and morphological features on the reading fluency and comprehension skills of a sample of approximately 160 freshmen with and without learning disabilities at a full-inclusion high school in which students with disabilities are taught alongside their non-disabled peers. In this study, orthographic conventions included not only the rules which govern the addition of affixes, but also those that dictate how syllables and sounds are spelled within words. The morphological features were based on Latin roots and Greek combining forms that Henry (1990) recommends for instruction due to the frequency with which they occur in written

language, and suffixes and prefixes that occur most frequently in third- through ninth-grade texts (White, Sowell, & Yanagihara, 1989).

The treatment variable for the study was mode of instruction and included two levels: a spelling intervention consisting of instruction in and practice with orthographic conventions and morphological features (the experimental group) and in-class independent reading (IR) time (the control group). In-class independent reading time was already part of instruction for the Freshman English classes at the participating school and is considered by many to be an efficient way to increase reading fluency and comprehension (Trelase, 2001). Participants in both groups were also assigned independent reading as homework. A second independent variable was time: reading comprehension measurements were taken before the treatments begin and after each third of the intervention to investigate whether time is a factor in the development of students' reading comprehension skills.

The dependent variables consisted of the students' reading fluency rates as measured both before and after the intervention by a timed reading on a grade-level passage from released CST test questions, and their reading comprehension as measured by scores on the Nelson-Denny Reading Test (NDRT) (Brown, Fishco, & Hanna, 1993), a test of vocabulary knowledge and reading comprehension. The test has two equivalent forms, which were used alternatively in each follow-up assessment. Each form is comprised of two subtests, one that measures vocabulary knowledge and one that measures reading comprehension. The reading comprehension subtest was administered twice during the intervention (after each phase consisting of 12 lessons) for repeated measurement.

Although intact-group classes were the unit of study, the intact freshman-English classes were assigned randomly to either the treatment or the control group. There were subsequently four classes in each group, taught by three different teachers in order to have treatment and control classes taught by the same teacher. Each class consisted of between 19 and 20 students, resulting in a possible total of 80 students in each group. The participants in the study included students of varying English Language Arts proficiency levels as defined by their score on the California State Testing and Reporting exams and students with individualized education plans (IEPs). All participants were given a spelling test before the intervention began to serve as a covariate, if needed.

The spelling intervention was created and implemented by the researcher, based upon word-study strategies in *Words Their Way* (Bear, Invernizzi, Templeton, & Johnston, 2004) and spelling strategies in *A Multi-Sensory Approach to Language Arts for Specific Language Disability Children, Book 3* (Slingerland, 1994). The intervention took place for 20 minutes of every class period during the 2007 Fall semester, with the exception of four classes at the beginning and end of the semester and two classes mid-semester that will be used for the pretests, posttests and mid-tests. The control group received 20 minutes of IR time, at the same time of the class period as the spelling intervention. There was a total of 33 class sessions utilized for the intervention, divided into three, eleven-lesson phases.

In addition to investigating whether the spelling instruction focusing on orthographic conventions and morphological features has an effect on reading fluency and comprehension skills, the data were further analyzed to examine whether the effects were equivalent for students with and without a diagnosed learning disability as defined

by whether or not they have an Individualized Education Plan, and for students with different English Language Arts proficiency levels as measured by their CST scores. A secondary goal of this study was to investigate whether there is a differential effect for students of differing reading abilities.

Significance of the Problem

Graduating from high school without sufficient literacy skills is an unfortunate reality for many students that significantly handicaps their chances of success in the workforce. The percentage of jobs that are classified as skilled has risen from 20% in 1950 to approximately 85% today (Education Trust-West, 2004). Employers increasingly need workers who can read and understand informational and technical texts. As a consequence, there are fewer vocational opportunities for students who do not graduate from high school and pursue further education in a specialized area.

Even among students who do complete a high-school diploma, literacy rates are often insufficient for the current demands of employers; many blue-collar jobs now require strong skills in reading technical documents and manuals (Education Trust-West, 2004). Additionally, colleges are adding more and more remedial English courses because high-school graduates are lacking the reading fluency and comprehension skills necessary for success (Trelease, 2001). Although many states have implemented subject-specific standards that educators are expected to teach in order to increase their students' skills, the progression toward proficiency for all students has been slow. In California, for example, 36% of the 2007 high-school senior class scored at the proficient level or higher in English Language Arts on the Standardized Testing and Reporting (STAR) test, the most since its inception (CDE, 2006a). This percentage has steadily increased from

29% when the CSTs began in 2001, but does not reflect the number of students who drop out of high school before reaching their senior year.

California is not the only state in which students at the secondary level have been found to lack basic English skills. The average proficiency rate on a high-school proficiency assessment in New Jersey in 2001-02 was 73% (Waff & Connell, 2004). In Connecticut, Shankweiler, Lundquist, Dreyer, and Dickinson (1996) studied 9th- and 10th-grade students attending a private school for students with learning disabilities and 9th-grade students with average-reading abilities attending a public high school. They found that even though the students without disabilities performed better than those with diagnosed learning disabilities, both groups displayed deficiencies in decoding (word identification) and spelling (orthographic conventions). Decoding and spelling skills were found to correlate with reading comprehension for both groups. Shankweiler et al. defined orthographic conventions as the rules that dictate the spelling of words with affixes. Their findings led them to question the adequacy of reading and spelling instruction at the high-school level and the assumption that students have mastered basic literacy skills before reaching secondary school.

Rasinski and Padak (2005) found that ninth-grade students in Ohio lacked reading fluency, which contributes to reading comprehension (Allinder, Dunse, Brunken, & Obermiller-Krolikowski, 2001; National Institute of Child Health and Human Development [NICHD], 2000; Shaywitz & Shaywitz, 2004). Reading fluency is the automatic word identification for the purpose of reading comprehension (Pilulski & Chard, 2005). When Rasinki and Padak (2005) studied the reading fluency rates of ninth-grade students completing their first year in high school in an urban area of Ohio by

measuring the number of words read correctly per minute, they found that over 60% of the students in their sample read below the 25th percentile for eighth graders. A lack of fluency not only impedes reading comprehension but contributes to overall poor school performance and negative attitudes toward reading. Secondary schools need to increase instruction in reading fluency and spelling if students are to increase their reading skills in order to be successful in the workforce and prepared for post-secondary education.

Theoretical Rationale

Several models of the reading process provide the theoretical base for this study. Each model has been created in an effort to explain the process of reading comprehension as one of obtaining meaning from print through identifying words. Although the identification of words and their meanings is only one component of reading comprehension, along with sentence (Davis, Lindo, & Compton, 2007) and textual levels, comprehending words is the basis for reading comprehension at the sentence and textual levels, and hence is the focus of the current study. Each model presented and discussed focuses on different aspects of the process of obtaining meaning from a printed word, which contribute to the model that serves as the conceptual basis for the current study.

Baron and Treiman (1980) proposed a model of reading (see Figure 1) that broadly demonstrates the reciprocal relationships between sound, print, and meaning. In this model, print represents the shapes of letters, groups of letters, or words. This is the orthographic representation of the word on paper. The sounds are the phonemes and combinations of phonemes that the printed graphemes or words represent. Phonemes are the smallest unit of sound in a language and graphemes (letters) are their representation in print. Sounds, or pronunciations, are derived from print when readers decode words

sound-by-sound by following correspondence rules (orthographic conventions) or make word-specific associations (the ability to read whole words fluently).

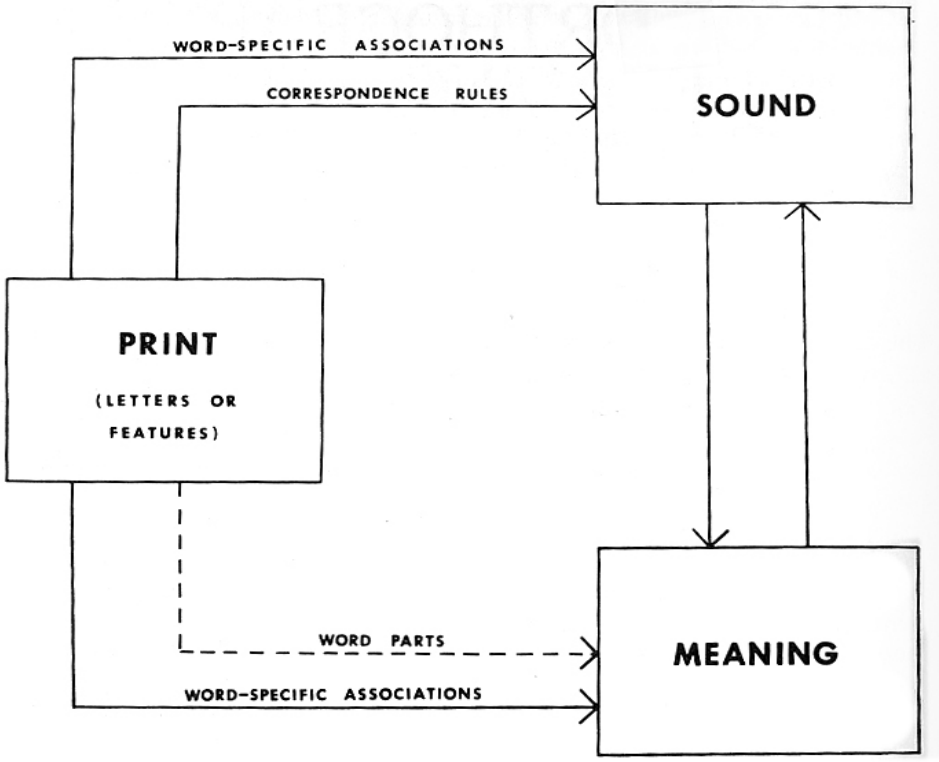

Figure 1. Baron and Trieman model of reading processes (1980, p. 172).

Meaning represents the meaning of words, both spoken and written. As illustrated in the model, meaning is derived from both printed texts and spoken words. The arrow extending from sound to meaning is the process of comprehending auditory input; the arrow from meaning to sound represents the process of encoding meaning into speech. The arrows extending from print to meaning indicate the process of reading comprehension. In Baron and Treiman's model (1980), reading comprehension occurs through making meaning of word specific associations (knowledge of the meanings of words, or vocabulary) and through making meaning of word parts (morphemes).

Morphemes serve as phonological, orthographic, semantic, and syntactic units (Carlisle, 2003); consequently, they play a role in each of the three areas presented in

Baron and Treiman's model (1980). Each combination of printed letters and each combination of sounds that has meaning is at least one morpheme. Morphemes are the units of language that carry not only content meaning, but meaning regarding the relationships between words as well. Thus, as Carlisle (2003) posits, as students develop an awareness of morphemes, their word identification and reading comprehension skills should increase as well.

Ten years after Baron and Treiman (1980) posed their model of the reading process, Adams (1990) put forth her own model which is similar in many aspects but clarifies the relationships between print, sound, and meaning and extends the model to include the context in which the reading takes place (see Figure 2). In her model, the orthographic processor takes in printed words as the process of reading and outputs print as the process of writing. As the double-headed arrows indicate, the orthographic processor is also influenced by knowledge of phonology (knowledge of sounds and how they are combined) and meaning, which is influenced by knowledge of the context in which the reading is taking place. The phonological processor takes in and outputs speech but also has a reciprocal relationship with the orthographic processor and the meaning processor.

The process of creating meaning from speech or text (listening or reading comprehension, respectively) occurs in the meaning processor, although it affects and is affected by the context of what is being read or heard. It is the meaning processor that connects what is being read to previous knowledge and concepts already acquired. The context processor contributes to reading comprehension in the form of contextual clues found in the text. Context can help readers discern between multiple meanings of words

and provide clues to the meanings of unfamiliar words (Irvin, 2001). Morphemes, which contain information about sound, spelling and meaning, play a role in each of the processors in Adam's model, with the exception of the context processor.

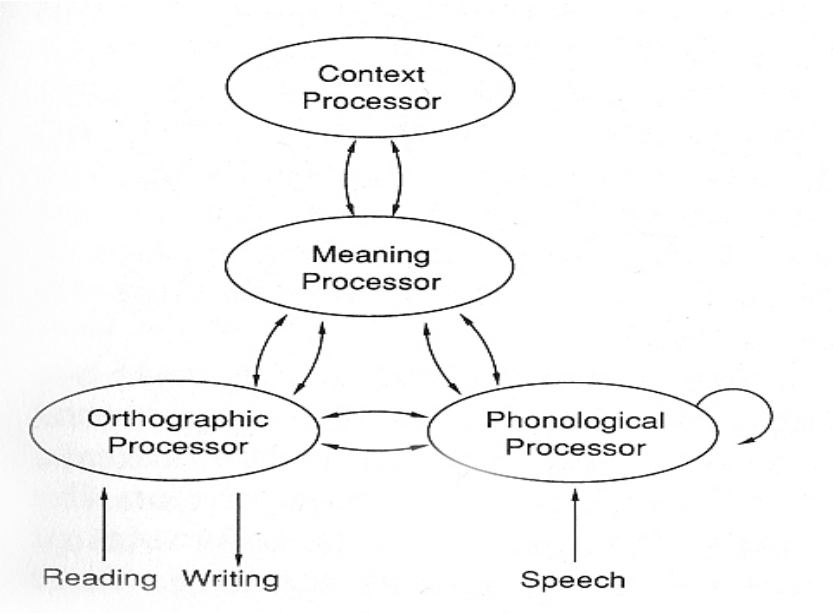

Figure 2. Model of reading processes by Adams (1990, p. 395).

More recently, Shaywitz (2003) proposed a model of reading that highlights the role of word identification in the process of getting meaning from text (see Figure 3). Meaning in her model is textual, the process of comprehending what is read. In Shaywitz's model, general intelligence, vocabulary knowledge, reasoning abilities, and the ability to form concepts, which are comparable to the meaning and the context processors in the model proposed by Adams (1990), contribute to the comprehension of written words, once they are identified. Shaywitz highlights the role of decoding as the most direct route to word identification. In her definition, decoding is the process of converting graphemes to phonemes in order to sound out words and consequently is directly affected by phonological skills. Phonological skills are the ability to notice,

identify, and manipulate the sound structure of words from syllables to individual phonemes. In her model, the break shown between decoding and word identification represents a lack of phonological skills on the part of readers with dyslexia.

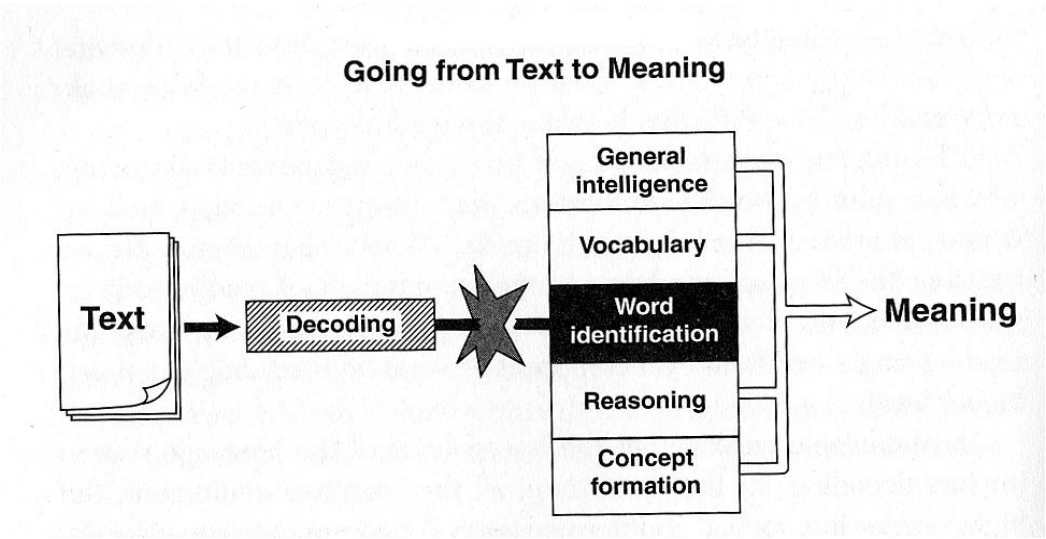

Figure 3. Shaywitz model of reading (2003, p. 54).

If English were an alphabetic language with one-to-one sound-symbol correspondences, phonological skills would be sufficient to decode written language in Shaywitz's definition. The written system of English, however, is made up of only 26 letters; there are approximately 40 phonemes in the spoken language. To illustrate, only 17 of the 21 consonants in English represent a single, specific sound (Henry, 2003). According to Henry, decoding requires more than just phonological skills. In her definition, decoding is the process of pronouncing a word either orally or in one's head to identify the word. Hence, the process of decoding, in Henry's definition, includes automatic recognition, sound-by-sound pronunciation, or the identification of word parts that is the result of knowledge of morphemes and orthographic conventions.

Orthographic conventions are the rules that dictate how letters can be combined to make syllables and which letter combinations create new sounds (Moats, 2000). In

addition, the written system of English represents units of meaning (morphemes) as well as sounds (Templeton & Morris, 1999). Words that are semantically related are spelled similarly, regardless of pronunciation. Knowledge of morphemes can facilitate word identification by reducing the need for letter-by-letter decoding (Singson, Mahony, & Mann, 2000). In this study, the decoding process to which Henry (2003) alludes is referred to as word identification and is the result of decoding as defined by Shaywitz (2003) or an analysis of the orthographic conventions and morphemes of the word.

In all three models, words must be identified before they can be understood. In order to identify words, readers may be able to fluently read the words or they may need to analyze the word to reach at identification. Word analysis may include decoding words sound-by-sound, or it may need to involve an analysis of the orthographic conventions that constrain syllables or the morphemes that make up the words. One way to integrate the models and clarify the reading process is proposed below (see Figure 4).

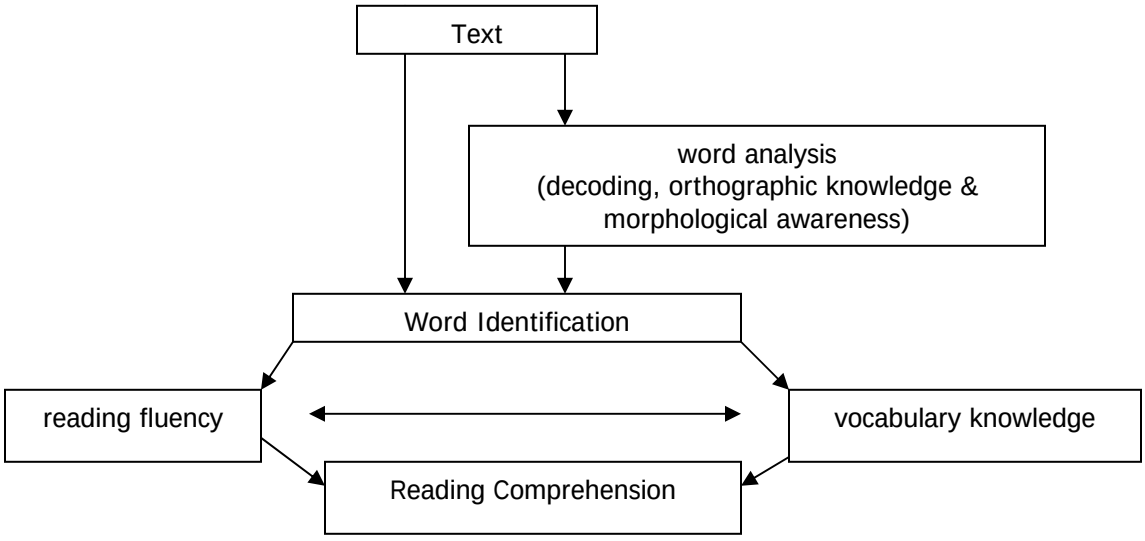

Figure 4. Researcher-designed model of the process of comprehending text.

In the researcher-designed model, written text is either identified immediately upon sight or analyzed. Word analysis involves either decoding sound-by-sound or analysis of the word utilizing knowledge of orthographic conventions and morphological features of the word. As learners' knowledge of orthographic conventions and their morphological awareness are developed, metalinguistic skills are built, along with a familiarity with words which leads to reading fluency (Allinder, Dunse, Brunken, & Obermiller-Krolikowski, 2001). Fluent reading frees cognitive resources for reading comprehension (Shaywitz, 2003).

Knowledge of orthographic conventions and morphological awareness also contribute to vocabulary knowledge because of increased development of learners' understanding of word parts – syllables and morphemes (Bhattacharya & Ehri 2004; Ehri & Wilce, 1987; Graham, Harris, & Fink Chorzempa, 2002; Heese, Robinson, & Rankin, 1983). Word identification is a necessary step toward reading fluency and vocabulary knowledge. Reading fluency and vocabulary knowledge lead to reciprocal increases in both skills, as well as to reading comprehension (Shaywitz, 2003).

A large body of literature has examined the role that decoding plays in word identification. The current study focuses on the role of knowledge of orthographic conventions and morphological awareness in word identification leading to the development of reading fluency and reading comprehension. If increasing knowledge of orthographic conventions and morphological awareness contributes to students' familiarity with and knowledge of words and their constituent parts, then an increase in reading fluency and comprehension will result.

Background and Need

Literacy is the most important outcome of education (Adams, 1990; Perera, 1999; Shaywitz, 2003) because "reading is the key to knowledge" (Edwards, 1997). One of the most essential components, and perhaps the most important aspect of literacy instruction, is reading comprehension. Without being able to understand what they read, students cannot access the majority of their educational resources. The *Report of the National Reading Panel* (NICHD, 2000) describes reading comprehension as a complex process by which meaning is derived from text. Reading comprehension occurs at three levels: text, sentence, and word. At the textual level, relevant background knowledge is necessary for reading comprehension to occur efficiently (Davis, Lindo, & Compton, 2007), as well as monitoring strategies (Therrien, Gormley, & Kubina, 2006). Knowledge of grammatical structure is essential for sentence-level reading comprehension (Davis et al., 2007).

In order for word-level reading comprehension to occur, readers must not only be able to identify printed words, but do so accurately, rapidly, and efficiently, in other words, fluently (Kuhn & Stahl, 2003). In addition to reading fluency, the *Report of the National Reading Panel* (NRP; NICHD, 2000) lists vocabulary learning (increasing vocabulary knowledge) as playing a critical role in reading comprehension. The report adds that instruction that results in increased vocabulary knowledge positively influences reading comprehension, particularly when vocabulary instruction is embedded in meaningful, authentic contexts (Pearson, Hiebert, & Kamil, 2007). The focus of the current study will be reading comprehension at the word level and its development through increasing reading fluency and vocabulary knowledge by increasing students'

knowledge of orthographic conventions and morphological awareness. Studies reviewed investigated the reading skills of students both with and without disabilities, in an effort to understand literacy processes of all types of learners.

Fluency

Not only is there a strong correlation between reading fluency and reading comprehension (Katzir, Kim, Wolf, O'Brian, Kennedy, Lovett, & Morris, 2006; Rasinski & Paddak, 2005) but fluent readers also expend less energy identifying words and as a consequence have more cognitive resources available for reading comprehension than disfluent readers (Kuhn & Stahl, 2003; NICHD, 2000; Shaywitz, 2003; Trelease, 2001). The *Report of the National Reading Panel* (NICHD, 2000) lists two common approaches to increasing students' reading fluency: oral reading with guidance and encouragement of students' individual reading. Researchers like Sample (2005), Stahl and Kuhn (2002) and Therrien (2004) advocate oral reading approaches, which include repeated reading, both with and without assistance. Therrien (2004) reviewed the literature in the area of reading fluency and found that repeated reading improved reading fluency for students with and without a learning disability.

In its meta-analysis of programs designed to increase reading skills, the National Reading Panel (NICHD, 2000) concluded that oral reading with guidance significantly and positively impacts word recognition, fluency, and reading comprehension. Programs that utilize oral reading with guidance to improve students' reading fluency skills have focused on the skills of reading individual words (Torgesen, Alexander, Wagner, Rashotte, Voeller, & Conway, 2001), practicing reading aloud (Allinder, Dunse, Brunken, & Obermiller-Krolikowski, 2001; Vadasay, Sanders, & Peyton, 2005), and

repeated reading (Alber-Morgan, Ramp, Anderson, & Martin, 2007; Paige, 2006; Rashotte & Torgesen, 2005; Thaler, Ebner, Wimmer, & Landerl, 2004; Therrien, Wickstrom, & Jones, 2006). Although there is strong empirical evidence that oral reading procedures increase reading skills, the majority of the experimental research has been done with students in elementary or middle school. One contributing factor may be practical difficulties of incorporating oral reading into a high-school class and the reluctance of adolescents to read a passage repeatedly (Sample, 2005).

Approaches that encourage individual reading include a program called Sustained Silent Reading (SSR), which is currently utilized in many high schools (Trelease, 2001). In SSR, students choose their own reading materials and have time in-class to read. The time for reading should be limited and increase with maturity. While students are reading, teachers are encouraged to read as well, in order to serve as a model for their students (Gardiner, 2005; Krashen, 1988). No records should be kept of the students' reading, nor should they be expected to report or be assessed on their reading. Researchers who advocate SSR claim that time to read, and only read, is an effective tool for increasing reading comprehension (Fisher, 2004; Gardiner, 2005; Krashen, 1993).

Krashen (1988) reviewed the literature on SSR programs and found that groups of students who received SSR performed as well as or superior to their peers on measures of vocabulary knowledge and reading comprehension. He argued that SSR or other self-directed reading programs are equivalent to traditional programs and even superior when carried out over more than 7 months. Trelease (2001) also reviewed and presented research that supported SSR on an international basis, including his own. In all of the research that he reported, both experimental and descriptive, the amount of time reading

positively correlated with reading achievement. Most of the current research on the effectiveness of SSR, however, is descriptive or case-study in nature (Bryan, Fawson, & Reutzel, 2003; Greenwood, Tapia, Abbott, & Walton, 2003; Waff & Connell, 2004). The National Reading Panel (NICHD, 2000) was unable to find experimental studies on the use of SSR programs that were reported in refereed journals, conducted on students in kindergarten through grade 12 and measured reading fluency. The few experimental studies that they were able to find (14) measured growth in vocabulary knowledge and reading comprehension.

Many programs have reported success with an adapted SSR format. For example, Parr and Maguiness (2005) and Kelly and Clausen-Grace (2006) reported on programs that incorporated conversations about texts read in the SSR program to encourage students to read. The program which Parr and Maguiness reported took place in New Zealand with 8 reluctant readers between the ages of 13 and 18. The amount of time allotted at the school for SSR was 20 minutes per day. The teachers conversed with their students about the books that they were reading. Although not all of the students increased the amount that they read as a result of the conversations, they did report that they approached reading differently as a result of the SSR program, and were subsequently choosing more difficult texts to read.

The program that was implemented by Kelly and Clausen-Grace (2006) was also a response to reluctant readers. Based on research that supports SSR's effect on reading achievement, their program was an adaptation of SSR and a result of observations of students who spend their SSR time pretend-reading or otherwise occupied. The participants were students in the third-grade class taught by one of the researchers, and

the program modified SSR by adding written reflections and oral sharing both in student pair groups and as a whole class, after a period of time reading in which relaxation was stressed. Engagement, reading comprehension, and metacognitive awareness were measured after 4 and then 7 months. The students increased in all areas, particularly metacognitive awareness. On an affective level, students seemed more motivated to read and found reading more enjoyable.

Akmal (2002) described an approach to SSR for middle-school students that not only included conversations about reading, but used contracts to hold the students accountable for the amount that they read. Although not advised by Krashen (1988), who advocated reading purely for enjoyment, Akmal (2002) found that reading contracts provided structure for the conferences he held with his students about their reading. The contracts were individually negotiated and included reading goals that were reviewed weekly. Contracts also included an agreed-upon format for the students to demonstrate their understanding of the books read. Akmal found that this approach to SSR provided him a way to give his students a grade, while encouraging them to read widely and offering them choices in the process of doing so.

Although fluency is considered a critical component of reading (NICHD, 2000), there is disagreement regarding the most effective process of increasing students' fluency skills. Oral reading procedures have been empirically supported, but are not easily employed at the high-school level. Encouraging independent reading is anecdotally supported but less empirically so. In addition, criticism of independent reading programs includes concerns that students can fake engagement with texts, and that if allowed to choose their own texts, students may choose books below their reading level (Stahl &

Kuhn, 2002). The current study aims to increase fluency by increasing students' familiarity with words and parts of words.

Vocabulary

Researchers and educators alike agree that there is a strong connection between vocabulary knowledge and reading comprehension (Bryant, Goodwin, Bryant, & Higgins, 2003; Irvin, 2001; NICHD, 2000). Shaywitz (2003) has described vocabulary knowledge as "a key element in facilitating reading comprehension" (p. 106). According to the National Reading Panel (NICHD, 2000) vocabulary can be taught implicitly or explicitly. Implicit programs encourage extensive reading in order to expose students to words. Although the National Reading Panel did not review studies that included programs that encouraged extensive reading, Krashen (1993) reviewed studies that supported the contention that programs like SSR exposed learners to new vocabulary words in context and contribute greatly to their vocabulary knowledge growth. Sustained Silent Reading (SSR) is one of the most widely utilized approaches to encourage extensive reading and teach vocabulary implicitly (Trelase, 2001). Some researchers contend that SSR is the most effective way to build vocabulary knowledge (Gardiner, 2005). They argue that, based on the analysis of printed school English done by Nagy and Anderson (1984), "even the most ruthlessly systematic direct vocabulary instruction could neither account for a significant proportion of all the words children actually learn, nor cover more than a modest proportion of the words they will encounter in school reading materials" (p. 304). A positive relationship has been found between wide reading and vocabulary growth (Kelly & Clausen-Grace, 2006; NICHD, 2000).

The National Reading Panel (NICHD, 2000) defines explicit methods of teaching vocabulary as those which teach students definitions or attributes of words. Among the explicit approaches advocated to increase students' vocabulary knowledge are those that increase students' knowledge of words through developing familiarity with the words (Bryant, Goodwin, Bryant, & Higgins, 2003) and those that utilize word-study techniques, including morphological analysis (Allen, 2000; Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003; Irvin, 2001; Templeton & Morris, 1999), which has been defined as "linking morphemic units (prefixes, suffixes and base or root words) with an understanding of their semantic and syntactic roles" (Carlisle & Stone, 2005, p. 446). Morphological analysis is the ability to divide words into their constituent parts in order to comprehend the words' meanings (White, Power, & White, 1989).

Morphological Awareness

Morphological awareness contributes to many aspects of linguistic knowledge. Morphemes, the smallest unit of meaning in a language, contain phonologic (sound), orthographic (spelling), semantic (meaning), and syntactical (grammatical) information (Carlisle, 2003). As a result of the linguistic awareness that is necessary for understanding morphemes, morphological awareness had been observed to contribute to reading fluency (Carlisle, 2003; Carlisle & Stone, 2005; Feldman & Andjelkovic, 1992; Mahony, Singson, & Mann, 2000). Morphological awareness also contributes to vocabulary knowledge (Carlisle, 2000; Fowler & Liberman, 1995; Nagy & Anderson, 1984; White, Power, & White, 1989). Additionally, studies by Arnbak and Elbro (2000) and Carlisle (1995, 2000, 2003) showed that morphological awareness contributes to reading comprehension independent of vocabulary knowledge. Morphological awareness

has also been found to contribute to spelling skills (Ehri, 1989; Heese et al., 1983; Shankweiler et al., 1996; Treiman & Cassar, 1996).

Morphological awareness leads to word identification because it supports the process of learning to decode words (Carlisle, 2003). Reading fluency is enhanced by morphological awareness as a result of the rapid recognition of words with similar morphemic elements (Feldman & Andjelkovic, 1992). Words with similar morphological features as those that are known by the reader are identified more rapidly than those that are unique. Regarding vocabulary knowledge, Nagy and Anderson (1984) studied the numbers and types of words found in printed school English. One result of their study is that there are approximately 88,500 distinct words that students encounter. More importantly, they discovered that the meanings of over half of the words acquired by school-age children can be inferred from knowledge of the morphological features of the words. As a consequence, Nagy and Anderson suggested that knowledge of morphology plays an important role in an efficient development of vocabulary knowledge.

Building on Nagy and Anderson's findings, Baumann et al. (2003) found that increasing morphological awareness increased the vocabulary knowledge of fifth-grade students. Their study compared textbook vocabulary instruction (received by the control group) with an instructional approach that combined morphemic and contextual analysis for the purpose of teaching social-studies vocabulary words. The morphemic and contextual analysis instruction centered around a vocabulary rule that provided guidelines for students to analyze unknown words. The analysis procedure included looking for textual clues around the unfamiliar word that provide insight into the word's meaning,

breaking the word into parts (prefixes, roots and suffixes) to determine meaning, and re-reading the sentences around the word for verification of determined meaning. Baumann et al. found that the control group performed both statistically ($F = 23.678$, $p = .002$) and practically ($\eta^2 = .179$) better than the morphemic and contextual group on a textbook measure of vocabulary, which was likely due to the fact that the control group studied only the vocabulary words in the textbook. More importantly, however, the group that received instruction in morphemic and contextual analysis performed statistically ($F = 2.397$, $p = .00$) and practically ($\eta^2 = .423$) better on a test of morphemically decipherable transfer words. These transfer words were not explicitly taught in the program, but the participants were able to understood them as a result of the strategies they had learned. The qualitative data they collected from the teachers and students in the study indicated that all students claimed to have a better understanding of the material as a result of the interventions, but the students who received training in morphemic and contextual analysis reported using the strategies they learned in other contexts as well.

Many other researchers have established a correlation between morphological awareness and vocabulary knowledge for students from first through ninth grades. For example, the result of a study by Carlisle and Nomanbhoy (1993) was that, for first grade students, correlations between morphological awareness and vocabulary knowledge ranged between .40 and .49. Nagy, Berninger, Abbott, Vaughan, and Vermeulen (2003) studied the morphological awareness and vocabulary knowledge of second and fourth-grade students with resultant correlations between .28 and .41 for the second graders and .32 and .55 for the fourth graders. In a study by Carlisle (2000), morphological knowledge accounted for 41% of the variance in vocabulary for third graders and 53% of

the variance in vocabulary for fifth graders. Mahony et al. (2000) studied students in grades three through six and found that the correlation between their morphological awareness and vocabulary skills ranged from .40 to .42. Additionally, the children's recognition of morphological relationships increased with grade level. In contrast, in a study of students in grades four through nine by Nagy, Berninger and Abbott (2006), the correlations between morphological awareness and vocabulary knowledge ranged from .67 to .83, decreasing as students increased in grade level. Shankweiler et al., (1996) studied ninth graders, and reported correlations between morphological awareness and spelling skills ranging from .52 to .85 and correlations between spelling skills and vocabulary knowledge from .60 to .65. The results were consistent for students with and without identified learning disabilities.

Morphological awareness has also been shown to have a connection with reading comprehension, independent of vocabulary knowledge (Nagy, Berninger, & Abbott, 2006). In researching predictors of reading comprehension skills of second-grade students without learning disabilities, Carlisle (1995) conducted a longitudinal study of a group of 85 children from kindergarten through second grade. Her results suggested that, compared to an auditory analysis test that measured phonological awareness, a morphological production task was a stronger predictor of reading comprehension. According to Arnbak and Elbro (2000), not only can morphological awareness be taught to fourth and fifth-grade students with dyslexia, it contributes significantly to their reading comprehension skills: the group which had received training in morphology showed a larger gain in reading comprehension than the control group ($p < 0.05$).

In addition, morphological awareness in elementary and middle-school students has been linked to their spelling skills. Nagy, Berninger, Abbott, Vaughn, and Vermeulen (2003) reported a small but positive correlation between morphological awareness and spelling skills for second (.03 to .12) and fourth graders (.15 to .25). When Nagy, Berninger, and Abbott (2006) evaluated the morphological awareness and spelling skills of students between the fourth and ninth grades, they calculated positive correlations ranging from .60 to .85, with the strongest correlation exhibited by the sixth and seventh graders. According to Shankweiler et al. (1996), for ninth-grade students both with and without identified learning disabilities, the correlation between morphological awareness and spelling skills was .52. In their study of ninth and tenth-grade students, Shankweiler et al. showed that morphological awareness has a greater relationship with the reading of older students than that of younger students. Other researchers' results (Baumann, Edwards, Font, Tereshinski, Kame'enui, & Olejnik, 2002; Moats & Smith, 1992; Wysocki & Jenkins, 1987) concur that morphological awareness is more important for older readers than younger. In a structural equation model done by Nagy, Berninger, and Abbott (2006), morphological awareness only contributed significantly to the decoding rate of eighth and ninth-grade students, not those of students in the fourth through seventh grades ($r = .54$).

Experimental studies have been conducted on the effects of increased morphological knowledge on the spelling skills elementary and middle-school students. According to Arnbak and Elbro (2000), increasing the morphological awareness of dyslexic fourth and fifth-grade students led to an increase in spelling skills on every measure, particularly the students' ability to preserve derivations and sounds ($p < 0.01$).

Heese et al (1983) found that increasing the morphological awareness of seventh-grade students had a small effect on their spelling skills (explaining 1% of the variance). The current study will measure the effect of increased morphological awareness, with an emphasis on spelling, on the reading skills of high-school freshmen.

Orthography

Other researchers have examined the relationship between orthographic (spelling) skills and reading skills without focusing on the morphological level. All have shown that there is a moderate to high correlation between spelling skills and reading skills (Ehri 2000). Some, like Badian (1995, 2001, 2005), Goswami (1988), Stanovich and West (1989), and Wilson, Rupley, Rodriguez, and Mergen (1999), have established a relationship between knowledge of orthographic conventions and word reading. Others, like Berninger, Abbott, Zook, Ogier, Lemos-Britton, and Brooksher (1999), Ehri and Wilce (1987), and Graham et al. (2002), have shown that instruction in word parts or syllables increased the reading skills of students from kindergarten through second grade.

The majority of the research on spelling and reading skills has focused on elementary or middle-school students. Little research has been conducted at the high-school level. The only experimental study which included secondary students (participants were in the sixth through ninth grades) was conducted by Bhattacharya and Ehri in 2004. Their study included training in syllabic analysis (orthographic conventions) and measured participants' spelling and oral reading. The participants included 60 students, all of whom were identified as reading below grade-level. The participants received training in how to divide words into syllables or exposure to whole words on flash-cards. The results were that the syllabic training was more beneficial than

the whole-word exposure, which was more beneficial than no training at all. The students who were older (mean grade 7.1) but had lower reading levels (third-grade equivalent) benefited more from the syllabic training than the students who were younger (mean grade 6.6) and had higher reading levels (fourth through fifth-grade equivalent). Effect sizes ranged from .63 to 1.66 for the syllable training group and from -.02 to .77 for the whole-word training group. These results may indicate that older students are better able to take advantage of knowledge of orthographic conventions. Bhattacharya and Ehri conceded that the small number of participants in each group, and the limited number of treatment sessions (4 sessions of 30 minutes each), were limitations in their study. Further, reading comprehension was not measured, which they explained by asserting that decoding instruction alone does not benefit older students without vocabulary instruction. The current study addresses this issue by including instruction in the meanings of morphemes.

At the high-school level, reading and spelling skills are not usually the focus of research or classroom instruction (Chandler, 2000; NICHD, 2000; Shankweiler et al., 1996; Trelase, 2001) even though deficits continue to manifest themselves. The reason for the neglect may be that secondary educators and researchers assume that students have mastered basic reading and spelling skills by the time they enter high school. Another explanation could be that low-level literacy skills are not included in teacher-training programs for secondary English teachers. By the time students enter high school, they should have moved beyond the learning to read stages to the reading to learn stage and beyond (Fitzgerald & Shanahan, 2000). Not all secondary students have begun to read to learn, however, particularly if they had been taught to read and write utilizing

the whole-language approach, which teaches identifying words using clues that are external (contextual) rather than internal (morphological or orthographic) (Shaywitz, 2003). The whole language approach to literacy instruction assumes that children will acquire literacy skills through rich literary experiences and real opportunities to read and write (Henry, 2003). In whole-language instruction, there is no direct instruction of phonologic, orthographic, or semantic rules, features that facilitate reading fluency in good readers (Adams, 1990). The point of whole-language instruction is to seek meaning, not sounds or words (Liberman & Liberman, 1992).

Even if students had been taught phonics (phonological and orthographic relationships) at the elementary or middle-school level, it is likely they were not instructed in morphological features. There is a lack of focus on morphology as a literacy skill in primary school because many literacy educators and researchers hold the viewpoint that morphology is either too difficult for children or not important to their literacy skills (Adams, 1990). Additionally, many general educators, even at the elementary level, are not trained in lower-language literacy skills, and thus lack essential knowledge for teaching struggling learners (Mather, Bos, & Babur, 2001). Thus, instruction in morphology is often neglected at the elementary or middle-school levels (Carlisle, 2003). As a consequence, students may never receive instruction in the morphological features of English.

The current study will focus on basic-level reading skills at the high-school level. The intent will be to increase students' knowledge of orthographic conventions and morphological features for the purpose of developing students' reading fluency and reading comprehension at a full-inclusion high school. Although no researchers have yet

looked at the combined effects of instruction in orthographic conventions and morphological features, combining the approaches is advocated by literacy instructors (Henry, 2003; Slingerland, 1994). The rationale is that as students learn the rules for word patterns and the addition of affixes, they develop their metalinguistic knowledge (Templeton & Morris, 1999), their familiarity with words, and reading comprehension. The efficacy of the intervention, which will be an explicit approach to teaching vocabulary and familiarity with words, will be compared to in-class Independent Reading time, an implicit approach, over a period of one full semester (33 class sessions over 16 weeks).

Research Hypotheses

1. Instruction in orthographic conventions and morphological features of the English language will increase the reading fluency of high-school freshmen significantly more than giving them independent time to read during class.
2. Instruction in orthographic conventions and morphological features of the English language will increase the reading comprehension skills of high-school freshmen significantly more than giving them independent time to read during class.
3. Instruction in orthographic conventions and morphological features of English will have more of an effect on the reading fluency and comprehension skills of high-school freshmen who have been identified as having a learning disability as determined by their special education status than those who have not.
4. Instruction in orthographic conventions and morphological features will have more of an effect on the reading fluency and comprehension skills of high-school

freshmen who are below proficiency level in English Language Arts than those who are at or above proficiency as measured by their CST scores.

Definitions of Terms

Decoding: "the process of transforming graphemes into phonemes and then blending the phonemes into pronunciations" (Ehri, 1995, p. 116). For the purposes of this study, decoding is the process of word identification, which includes not only the transfer of graphemes to phonemes, but also the application of orthographic knowledge to read groups of graphemes and the knowledge of morphemes that contribute to the reading of words.

English Language Arts Proficiency: knowledge of and ability to read and write as measured a score of a 4 or higher on the California State Test (CST). The range of possible scores is 1-4, with 1 indicating *far below basic,* 2 *below basic,* 3 *basic,* 4 *proficient*, and 5 *advanced* (CDE, 2006a).

Full-Inclusion High School: a high school in which there are equal educational opportunities for all students in the same setting (Cawley, 2000). For the purpose of the current study, a full-inclusion high-school is one which includes all students with disabilities in general education classes. Students learning English are included in general English classes after being re-designated as fully proficient in English.

Independent Reading (IR): an approach to encouraging students to read widely that is based on SSR (Krashen, 1988). In IR, students are provided 20 minutes of time per class period to read and encouraged (but not required) to read books in the

Accelerated Reader program (Groce & Groce, 2005). The program provides short (10 item) quizzes upon the completion of each book.

Morphological features: the meaningful parts of words (Baumann et al., 2002; Nagy & Anderson, 1984). In this study, morphological features are the morphemes that make up a multi-morphemic word: roots, which are bound or free, and affixes, which are inflectional – suffixes that show possession, gender, number, voice, mood, or tense – or derivational – suffixes or prefixes that change a word's grammatical category (Yule, 1996).

Orthographic conventions: "constraints on letter sequences and letter uses" (Moats, 2000, p. 98). For example, orthographic conventions include the rules that require two consonants between short vowels in words like *tennis,* versus one consonant between a long vowel sound and a short vowel sound in words like *apex.* Orthographic conventions are also the rules that dictate the spelling of words with affixes (Shankweiler et al., 1996). These include the rules that require doubling the *f, l, s,* or *z* in *puff, fill, pass,* or *fuzz,* doubling the final consonant when adding suffixes in words like *grabbing,* dropping the final *e* when adding suffixes in words like *facing,* changing the *y* to *i* when adding suffixes in words like *tried,* or those that forbid the use of *j* or *v* in the final position. In this study, orthographic conventions will be defined as rules of syllable formation and combination, rules of spelling sounds (other than simple sound-symbol correspondences), rules for adding affixes, and etymological information that contributes to spelling knowledge.

Reading Comprehension: the process of making meaning from text (NICHD, 2000). In this study, reading comprehension will be measured using the NDRT (Brown, Fishco, & Hanna, 1993).

Reading fluency: "Reading fluency refers to efficient, effective word-recognition skills that permit a reader to construct the meaning of text. Fluency is manifested in accurate, rapid, expressive oral reading..." (Pilulski & Chard, 2005, p. 511). Shaywitz and Shaywitz (2004) have described reading fluency as "rapid, automatic reading that does not require attention or effort" (p. 9). In this study, reading fluency will be measured by the number of words correctly read per minute.

Sustained Silent Reading (SSR): a program in which students are encouraged to read and provided with 15 to 30 minutes of in-class time to do so, along with teacher modeling (Gardiner, 2005).

CHAPTER II
REVIEW OF THE LITERATURE

In order to address the issue of low literacy skills of many high-school students, with and without diagnosed learning disabilities, the current study investigated the effect of spelling instruction focusing on orthographic conventions and morphological features on the reading fluency and comprehension skills of a class of freshmen in a full-inclusion high school. The intent was to better understand the effect of spelling instruction on reading skills and to create resources that high-school teachers can easily incorporate into their daily lessons. Successful, efficient reading comprehension requires the ability to quickly and accurately decode words or read them fluently by sight (Adams, 1990). In addition, comprehending text requires knowledge of vocabulary, grammar, and background information (Davis, Lindo, & Compton, 2007). The focus of the current review is word-level comprehension, including fluently identifying words by sight and strategies to identify unfamiliar words.

The literature reviewed includes studies that researched students' knowledge of orthographic skills and morphological awareness in relation to awareness of word structure and how that structure signals sound and meaning, fluent word identification, and reading comprehension (Templeton, 1992). Due to the dearth of experimental research on knowledge of orthographic conventions and morphological awareness of high-school freshmen, the current study will be mainly based on research on orthographic conventions and morphological awareness in elementary and middle-school students. Studies that included students at the high-school level as participants are included whenever possible.

Four areas of research have been reviewed for the current study, including the lack of instruction in lower-level reading skills at the high-school level, reading fluency, orthographic conventions, and morphological awareness. Section One includes studies that identified a lack of lower-level literacy skills in the high-school students and a lack of literacy knowledge in teachers and that investigated attempts to increase teachers' literacy knowledge. Studies in Section Two were designed to measure or increase students' reading fluency in order to increase their reading vocabulary, comprehension, or both. Section Three includes studies that measured or increased students' orthographic knowledge, or spelling skills, with the aim of increasing reading skills. Section Four focuses on studies of morphological awareness, and its relation to and effect on reading and spelling skills.

Section One: High-School Literacy Teaching

Many high-school freshmen are not receiving the literacy skills necessary for success in school or in the post-secondary options they choose to pursue. Public school classes are becoming more and more heterogeneous as a result of increased immigration and the movement to include students with disabilities in general education programs. As a consequence, high-school English teachers' roles have expanded to include second-language instruction and accommodations for various learning needs. At the same time, many students, regardless of cultural or linguistic backgrounds or learning abilities, are entering high-school without the literacy skills necessary to achieve the high demands of standards-based instruction, as is evident in publicly-available records of standardized testing. At the level of even basic literacy skills, inaccuracies in decoding and spelling have been found to occur at the high-school level (Shankweiler et al., 1996), despite the

fact that a strong correlation has been found between decoding and spelling skills and reading comprehension (Badian, 2001; Ehri, 2000).

In their descriptive study of 30 public high-school freshmen with average reading abilities and 35 freshmen and sophomores at a private school for students with learning disabilities, Shankweiler et al. (1996) found that the students with average reading ability only correctly spelled 66% of the words on an experimental spelling test, and 74% of the words on a morphology spelling test. Although their ability to decode real words was strong (99%), they were only able to decode 86% of the nonwords and could only achieve 78% accuracy on a test of phoneme deletion skills. The students with learning disabilities' scores were significantly lower in every area measured with the exception of a controlled reading test of regular words. Although a small number of students were tested by Shankweiler et al., the demographics of the sample was described as representative of southern New England where the study took place.

Proficiency in reading at the eighth-grade level has not been shown to guarantee sufficient preparation for comprehending high-school texts (Caldwell & Leslie, 2003). Caldwell and Leslie studied 8 eighth-grade students, 6 from a private school and 2 from a public school, and found that at the end of their eighth-grade school year, they had difficulties comprehending texts that are typically used in ninth-grade English and Social Science classes. All of the participants were proficient readers, as indicated by their scores on informal reading inventories, standardized test scores, and their performance in school. The participants were all able to retell the narrative text, which had a reading level between the fifth and eighth grade, significantly more accurately than the two expository texts, which had reading levels between the eighth and tenth grades, t (7) =

2.36, $p = .0\ 18$, and $t\ (7) = 2.36$, $p = .002$, respectively. Although their sample was small, the results found by Caldwell and Leslie indicated that students in high school may still need instruction in order to increase their comprehension skills.

Despite the fact that students may enter high school without sufficient reading comprehension skills, the lower-level literacy skills that support reading comprehension, such as decoding and spelling, are not usually taught at the high-school level (Adams, 1990; Chandler, 2000). There is evidence that even high-school students who have been diagnosed as having a reading disability and who have an Individualized Education Plan (IEP) are not being taught decoding and spelling (Catone & Brady, 2005). When Catone and Brady evaluated 54 IEPs of students with reading problems, they found that the majority of the academic goals in the IEPs were insufficient to meet the students' basic reading needs. The purpose was to examine whether the attention in the IEPs to basic skills in reading diminished as the student progressed through school. For the most part, goals were written for comprehension only; deficits in decoding were not addressed. A possible cause posed by Catone and Brady was the emphasis placed on study skills and content knowledge by special educators at the high-school level.

One possible reason for the lack of emphasis on lower-level literacy skills for non-disabled students at the high-school level is that, according to stage theories of reading development, high-school students should have moved beyond the learning-to-read stage to reading to learn (Fitzgerald & Shanahan, 2000). In grades 4-8, students should no longer need to learn decoding, spelling, and morphology, but concentrate on vocabulary development and comprehension strategies. At the high-school level, students should continue with vocabulary development and the acquisition of

comprehension strategies, incorporating multiple viewpoints and learning to synthesize their learning. A second reason is that high-school educators are not taught to teach reading and spelling (Chandler, 2000). The emphasis of teacher-training programs for secondary teachers of English is on literature and the writing process, with very little time devoted to surface features such as orthographic conventions or morphological features.

Even at the elementary level, few public-school educators have training in or knowledge of low-level literacy instruction (Mather, Bos, & Babur, 2001). In a study of 293 preservice teachers in a teacher-training program and 131 kindergarten through third-grade teachers, Mather, et al. measured their perceptions toward and knowledge of reading and spelling skills, replicating an earlier study by Moats (1994) in which it was found that teachers of reading and writing were not adequately prepared to teach lower-level literacy skills. The results of the perception and knowledge assessments done by Mather et al. (2001) were that, although the participants expressed strong beliefs about the importance of knowledge of reading and spelling skills, the preservice teachers averaged only 50% on the assessment of knowledge, and the average percent correct for the teachers was 68%. The implication is that although experience in the field increases teachers' knowledge of reading and spelling skills, even teachers with experience lack knowledge in basic literacy skills.

Not only do teachers think that reading and spelling skills are important, but evidence also suggests that they want to learn how to be more effective reading and writing teachers. Ganske, Monroe, and Strickland surveyed 191 first through sixth-grade teachers in seven different states regarding the problems they face in addressing the needs of struggling readers and writers in their classrooms. The questions and concerns were

coded and categorized into 9 major areas: variability in students' literacy levels and linguistic abilities; time, organization, and classroom management; strategies and skills; motivation; family involvement; testing and assessment; background knowledge; classroom environment; materials. The most common issue raised was the lack of, or need for, skills and strategies for teaching reading and writing (31.8% of respondents). Whether through pre-service instruction or on-going professional development, teachers expressed a need for further knowledge in reading and spelling knowledge.

There is evidence that teachers can be taught reading and spelling knowledge. In 2003, Spear-Swirling and Brucker studied 90 teacher-education students in a special-education credential program in order to examine their knowledge about word structure and measure the increase of that knowledge as a result of instruction. The participants had varying amounts of previous preparation in and experience with teaching reading. Although the amount of prior instruction in literacy skills influenced the participants' performance on the measures of word-structure knowledge (with those who had more experience out-performing those with less experience), prior experience teaching reading had no influence on the participants' scores. As a consequence, emphasis on lower-level literacy skills needs to be taught in teacher-training programs or subsequent in-service training.

Section Two: Reading Fluency

Reading fluency is the ability to read rapidly, accurately, and with appropriate expression (Stahl & Kuhn, 2000). Students who cannot read fluently struggle with reading comprehension (Shaywitz, 2003). This section summarizes information from several reviews and meta-analyses of research on increasing students' reading fluency,

then presents correlational studies that demonstrate correlations between reading fluency and other literacy skills, and concludes with reviews of experimental research on two approaches to increasing fluency skills: oral reading practice and efforts to increase the amount of independent reading done by students. The reviews and meta-analyses will be presented in chronological order; the other studies will be presented by grade-level of the participants.

Reviews and Meta-Analyses

In 1996, McCormick and Becker reviewed but did not compare 27 studies in the area of fluent word recognition and identification, which they defined as the ability to read a word automatically by sight and to identify an unknown word using strategies, respectively. They focused their research on issues regarding fluency instruction from a teacher's perspective. One issue that they reviewed was when and how to correct students when they are reading aloud. The studies they reviewed indicated that any type of correction of all errors is most beneficial, particularly for the poorest readers (Fleisher & Jenkens, 1983; Pany & McCoy, 1988; Perkins, 1988; Rosenberg, 1986).

A second issue reviewed by McCormick and Becker (1996) was different approaches used to increase reading fluency skills. One approach reviewed consisted of pre-reading before oral reading, either by listening as a teacher read the passage or reading it silently (Rose, 1984; Rose & Beattie, 1986; Rose & Sherry, 1984; Salend & Nowak, 1988). All four studies found that both strategies increased students' reading rates, but listening proved to be more advantageous than reading silently. Reading, copying, and writing words from memory improved word recognition in elementary students with learning disabilities (van Daal & van der Leij, 1992). In addition,

encouragement and scaffolding were shown to improve a student with a learning disability's word recognition skills more than processing time (Klenk, 1994). Lastly, extensive literacy experiences, including being read to, reading with, and re-enacting books, increase children's knowledge of orthographic conventions as well as word recognition skills (Katims, 1994).

As a part of its assessment of empirical research on reading and reading instruction, the National Reading Panel (NRP) analyzed studies on repeated reading for the purpose of increasing reading fluency (NICHD, 2000). In order for a study on repeated reading to be included in the analysis, it needed to include the intervention's impact on reading achievement in native-English speaking students in elementary or secondary school with English texts. Thirty studies fit the criteria and were included in the meta-analysis, with data from a total of 1,357 students in first grade through college, the majority of whom read below grade level. The mean weighted effect size for guided oral repeated reading was 0.41, which the panel reported as a moderate impact for the individuals in the studies. Additional studies on single-subject designs and methods comparisons were reviewed but not included in the analysis due to methodological issues.

Due to the fact that the analysis done by the NRP on fluency included both students with and without disabilities, Chard, Vaughn, and Tyler (2002) conducted their own synthesis of research on interventions for developing reading fluency in elementary students with learning disabilities. Their review included 24 studies on interventions that included three types of repeated reading programs: those with a model, those without a model, and those with reading goals. The criteria employed by Chard et al. were more inclusive than that of the NRP, including single-group designs and case studies. For

studies that employed repeated reading without a model, the mean effect size was 0.68. When repeated reading was used with a model, listening to an adult was more beneficial than listening to a peer (effect sizes of 0.46 and 0.57 respectively). Multiple readings were shown to contribute more to reading fluency than single readings, and a fixed criterion was more effective than an individual improvement criterion. They concluded that repeated reading does in fact improve the reading fluency of elementary students with learning disabilities.

The following year, Kuhn and Stahl (2003) reviewed developmental and remedial practices in the area of reading fluency due to their observation that the NRP combined many different types of interventions into one score. Kuhn and Stahl reviewed 58 studies on assisted reading, repeated reading or classroom interventions designed to increase reading fluency but did not conduct a meta-analysis because fewer than half of the studies (45%, or 26) had no control group. Interventions to increase reading fluency include strategies that employ independent learning strategies and those that assist readers by providing them with a model, either individually or in a classroom. In all of the studies reviewed, fluency instruction resulted in more of an increase in reading fluency and comprehension than traditional instruction with a basal reader. Additionally, more difficult texts were associated with stronger intervention effects. The generalizability of the studies are questionable, however, due to the frequent lack of experimental or quasi-experimental design, use of single or multiple base-line designs, and a lack of progress when compared to a norm.

In 2004, Therrien conducted a meta-analysis of research on repeated reading for the purpose of developing reading fluency. His purpose was to evaluate the effects of

repeated reading alone on reading fluency and comprehension, as well as determine components critical to a repeated-reading program's success, and evaluate the benefits for students with cognitive disabilities. He included in his analysis only experimental and quantitative studies that used school-age participants. The twelve studies that met his criteria, and were included in the meta-analysis, either measured students' ability to read the same passage that they had practiced or their ability to transfer their fluency to a new passage.

The analysis of the studies (Therrien, 2004) that employed non-transfer measures resulted in a mean fluency increase of 0.83 and a mean comprehension increase of 0.67. Of the variable components of the interventions, the cued reading had the highest effect size for reading comprehension when the students were cued to focus on comprehension (0.75) and the highest effect size for reading fluency when the students were cued to focus on both comprehension and speed.

The analysis of studies (Therrien, 2004) that included measurement of transfer of skills resulted in a mean fluency increase of 0.50 and mean reading comprehension increase of 0.25. The most effective component of the studies that employed transfer measures was an adult conducting the intervention rather than a peer (effect sizes of 1.37 for fluency and 0.71 for reading comprehension versus 0.36 and 0.22). Of the peer-run programs, the inclusion of modeling was more effective than its exclusion on reading fluency (0.40 versus 0.30) but not for reading comprehension (0.10 versus 0.45). The same pattern was found with or without corrective feedback (0.51 and 0.23 versus 0.46 and 0.52) and whether or not results were charted (0.57 and 0.11 versus 0.40 and 0.44).

As a result, it appears that peer modeling, corrective feedback, and charting of results were beneficial for the students' reading fluency, but not reading comprehension.

Therrien (2004) further compared studies that had students with disabilities as the participants to those that did not. The presence of a disability was based upon school criteria. The results of the studies, which used measurements of the same reading passage, demonstrated a stronger effect on the reading fluency of students without disabilities than those with (0.85 and 0.75 respectively), but a stronger effect for the reading comprehension of students with disabilities than those without (0.73 and 0.64 respectively). The studies which included transfer word measures were more effective for the reading fluency of both the students with and without disabilities than for reading comprehension (0.79 and 0.41 and 0.59 and 0.18 respectively). Therrien concluded that repeated reading interventions are beneficial for both students with and without disabilities, albeit differently.

More recently, Morgan and Sideridis (2006) addressed the lack of single-subject designs reviewed by the NRP by conducting their own meta-analysis of fluency interventions for students with or at risk for learning disabilities. They reviewed 30 single-subject studies with a total of 107 participants who were considered to have a learning disability or be at risk for one due to formal diagnoses, discrepancies between ability and achievement, referrals by teachers and parents, or receipt of Title 1 services. The interventions included providing keywords and previewing, listening and repeated readings, contingent reinforcement, goal setting with performance feedback, goal setting with performance feedback and reinforcement, individual word study, and tutoring.

The results of the analyses by Morgan and Sideridis (2006) indicated that gender, age, and placement differences (general education class or special education class) impacted a reading fluency intervention's effectiveness. Girls, older students (5th through 12th grade), and students in general education settings read more words per minute (wpm) than boys, younger students (K-4th grade students), and students in special education classes. Of the types of interventions analyzed by Morgan and Sideridis, only goal setting with feedback and reinforcement resulted in significant growth [$t(134) = 4.014$, $p < 0.25$]. They concluded that goal setting likely helps to provide students with feedback, motivation, and involvement in a reading fluency intervention.

Correlational Research

In recent years, researchers have shifted away from research establishing the importance of reading fluency, which has been firmly established by the NRP. Current research on reading fluency includes studies that search for variables that contribute to reading fluency in order to recommend instructional interventions (Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003; Katzir, Kim, Wolf, O'Brian, Kennedy, Lovett, & Morris, 2006). Additionally, there are some researchers who continue to demonstrate correlations between reading fluency and other measurements of reading along with continued deficiencies in reading fluency at the secondary level (Rasinski & Padak, 2005).

The aim of a study by Katzir et al. (2006) was to examine the relative contributions of phonological awareness, orthographic knowledge, and letter-naming skills of dyslexic children to their reading fluency. Their purpose was to address the lack of research on fluency in dyslexic children, particularly reading rate. They defined

fluency as both reading accuracy and automaticity, which relies on the integration of a student's knowledge of phonology, orthography, semantics, syntactic information, and morphology. The participants were 123 2nd and 3rd grade students who had been identified as having a reading disability. The participants were measured on their word attack and word identification skills, word-reading efficiency, oral reading of connected text, paragraph comprehension, rapid letter naming, phonological awareness, and orthographic recognition.

Katzir et al. (2006) calculated correlations among the scores of the measurements and performed hierarchical regressions to examine the relationships among the participants' reading skills. Results indicated that rapid letter naming correlated with all other measures (correlation coefficients ranged from 0.42 to 0.66). The only other measure that correlated with all of the reading measurements both at the word and the textual levels was the test of orthographic recognition (with correlation coefficients ranging from 0.41 to 0.70). The results of the hierarchical regressions also indicated that the rapid letter naming and orthographic recognition tests explained variance in all of the reading measures beyond that of background variables (16 to 53% for rapid letter naming and 30 to 62% for orthographic recognition). The results that Katzir et al. reported suggested the importance of orthographic knowledge in the reading processes and the connection between orthography and reading fluency.

Jenkins et al. (2003) also searched for sources of variance in reading fluency and comprehension abilities. Their sample of participants included 113 fourth-grade students, with above average, average, and below average reading skills equally represented. Measurements included timed oral readings of passages, word lists, and randomly

ordered words in paragraph format and a reading comprehension test. The participants' number of words correctly read per minute was significantly higher when reading passages than lists of words, which were read more quickly and accurately than randomly ordered words. Reading comprehension correlated most strongly with the participants' speed of reading passages, significantly more than with their speed of reading words in lists $t(110) = 7.86$, $p < .001$. A hierarchical regression analysis indicated that passage reading speed was a far stronger predictor of reading comprehension than list reading speed, adding 42% unique variance. Jenkins et al. also ran a hierarchical regression analysis to determine predictors of reading fluency, and found that comprehension contributed more to the variance than list reading speed (27% versus 11% respectively). Their conclusion was that fluency instruction is more beneficial for students when it employs words in context rather than in isolation and that comprehension of texts contributes to students' fluency.

The research focus of a study by Rasinski and Padak in 2005 was that older readers, in intermediate, middle, and secondary school, may have reading difficulties as the result of difficulties with reading fluency. Their study was an effort to address the lack of research on fluency beyond the primary grades. Rasisnski and Padak felt that the nature and difficulty of texts in the intermediate, middle, and secondary grades present new challenges to students in fluency and other areas of reading. They defined fluency as the ability to decode text effortlessly or automatically and the ability to phrase written text into appropriate and meaningful chunks.

To explore the fluency rate of adolescents, Rasinski and Padak (2005) measured the decoding ability and fluency rate of 303 ninth-grade students at the end of the school

year and found that even though the students' average decoding accuracy was 97.4%, the fluency rate for over 60% of the students was well below the 25th percentile for eighth graders. The students' fluency correlated strongly with overall reading performance (.53). Additionally, Rasinski and Padak found a significant correlation between the students' fluency and their performance on a standardized reading comprehension test. Rasinski and Padak concluded that repeated reading activities can be successfully employed with older readers in order to develop fluency skills. Additionally, the teacher's role should be to model fluent reading and coach students as they move toward fluency.

Oral Reading Practice

Studies that attempt to increase students' reading fluency using oral reading practice include those that focus on word-level reading (Torgesen, et al., 2001), oral reading practice (Allinder, et al., 2001; Vadasay, et al., 2005), and repeated reading (Alber-Morgan, et al., 2007; Paige, 2006; Rashotte & Torgesen, 2005; Thaler, et al., 2004; Therrien, et al., 2006).

The goal of a study by Torgesen et al. (2001) was to contribute information about the conditions that need to be in place in order to remediate the reading difficulties of children with serious learning disabilities (LD). The goal was to determine whether two approaches that both contain explicit instruction in word-level skills but vary systematically in their depth of instruction in phonemic awareness and extent of practice in decontextualized phonemic decoding skills would affect specific reading skills in different ways.

The participants in the study by Torgesen et al. (2001) were 60 eight to 10 year-old children who had been previously identified as learning disabled by the state of Florida's criteria, identified as having serious difficulty acquiring word-level reading skills by their teachers, and who performed below minimum required levels for their grade on a measure of phonological awareness. Students with a verbal intelligence score of less than 75 were excluded from the study. The participants were randomly assigned to two groups. One group received the Auditory Discrimination in Depth Program (ADD) that teaches common phonemes and the other group received a program called Embedded Phonics (EP) that taught word-level reading and spelling skills while providing extensive opportunities to read and write in a meaningful way. All participants received 67.5 hours of individual instruction in two, 50-minute sessions for 8 weeks and 8 weeks of in-class instruction of 50 minute duration once a week. Participants were administered measures of phonological skills, oral language skills, reading fluency and comprehension, and spelling as pretests and posttests 2-3 weeks following the intervention, as well as 1 and 2 years later.

Due to attrition, Torgesen et al. (2001) were able to analyze the results from only 50 students. The results of the analyses showed that participants' gender and race were not related to growth on any of the variables. Effects from the two interventions were similar (4.4 for ADD and 3.9 for EP) and stable from posttest to both follow-up assessments. The predictor variables most reliably associated with growth in broad reading ability were teacher ratings of attention and behavior, receptive language scores, and prior levels of reading skills. The children who started the study with the lowest scores showed the highest rate of growth on most of the reading variables. The only

measures for which the two treatment groups showed different rates of growth from pre- to posttest were the measure of word attack skills $F(1, 47) = 8.4$, and reading rate $F(1, 47) = 4.2$, and accuracy, $F(1, 47) = 4.4$. Both instructional methods produced very large growth rates for broad reading ability. Before intervention, all of the participants scored below 90 standard score on reading words, and 65% scored below 90 on the measure of passage comprehension. For both groups, the percent of students scoring below 90 dropped on all measures (to between 16 and 91%). Within one year of the intervention, 40% of the children exhibited average skills in reading and thus were no longer in need of special education services.

Vadasay et al. (2005) researched the effects of phonics-based supplementary reading interventions and whether or not oral reading practice adds to the effects of word study instruction. They defined word study as the repeated reading of word lists, combined with instruction in phonological and phonics skills. The participants consisted of 78 first-grade students scoring in the lowest quartile for reading skills from 12 urban schools with similar demographics. Students were divided into two treatment groups and a control group. The participants were individually tutored for 30 minutes, four times each week from October through May, by trained paraprofessionals who were randomly assigned to treatments (phonics based tutoring in reading and spelling with or without oral reading practice). Pre and post test measures of receptive vocabulary, letter knowledge, phonological awareness, reading accuracy, spelling, and reading comprehension were evaluated.

At the end of the treatments employed by Vadasay et al. (2005), the students who received either of the two treatments scored significantly higher on reading accuracy

$F(3,52) = 7.61$, $p \leq .001$, reading comprehension $F(1,54) = 8.36$, $p \leq .01$, passage reading fluency $F(2,53) = 8.41$, $p \leq .001$, and spelling measures $F(1,54) = 11.92$, $p \leq .001$, than the students in the control group. The only areas in which there was a difference in the results of the two different treatment groups was in passage reading fluency rate; the group which had oral reading practice outperformed the group which did not $F(1,35) = 4.82$, $p \leq .01$. Vadasay et al. concluded that the addition of reading practice increases student's oral reading fluency rate more than the word-study groups. Their findings were limited, however, by the fact that the interventions were supplementary and conducted by support personnel, and therefore may not be feasible in public schools.

In 2004, Thaler et al. addressed the problem of mixed empirical evidence for whether or not word-level reading training leads to comprehension of text. Their purpose was to evaluate the efficiency of repeated reading with poor readers of German. The participants consisted of 20 poor readers (reading below the 10^{th} percentile) whose reading rates were compared to 127 normal readers in the second through fourth grades. Participants received daily, individual training in word-level reading using lap-top computers for a period of 25 days. The training had a significant effect on participants' reading speed $F(1, 18) = 71.0$, $p < .001$ between pre and posttest measurements, although still slower than the control students $t(1, 45) = 7.9$, $p < .001$. Their conclusion was that, although word-level training increases poor readers' fluency, it is not sufficient to eliminate their reading problems.

Many studies have shown the effect of repeated reading utilizing above grade-level reading passages in elementary students. Paige (2006) evaluated repeated reading with above-grade level passages in his study of sixth-grade students with learning

disabilities. The participants were 11 African-American students in a special-education classroom setting. The intervention took place over six weeks, with the students reading one 100-word passage per week. Between Mondays and Fridays, students chose goals for increasing the amount of words correctly read. Pre and post test measures were collected using the Flynt-Cooter Reading Inventory for the Classroom (RIC) which determined a reading rate in correct words-per-minute. All participants increased their correct words per minute rate on the passages on a weekly basis. The rate of miscued words decreased between each Monday and Friday during the study as well. On the pre and post test measures, nine out of the eleven students showed an increase in correct words-per-minute read. An analysis of miscued words informed the researcher's knowledge regarding the students' decoding abilities.

Rashotte and Torgesen (1985) studied whether the amount of shared word in texts affected the success of a repeated reading program for elementary students with learning disabilities and whether repeated reading was more effective than an equivalent amount of non-repetitive reading. Success was defined as increasing the students' reading speed, accuracy, and comprehension. The purpose of their study was to address the lack of research on the effect of repetitive reading on reading speed, rather than accuracy alone. The participants of their study included 12 students between the second and fifth grades from three schools. The participants read for 15 minutes each day over 7 days in three different conditions: two repeated reading conditions, one with a high-degree of shared words, one without, and one non-repetitive reading condition. Participants' reading speed, accuracy, and comprehension were measured before the treatment began and again after each reading passage.

At the beginning of the study, all of the participants read quite accurately (mean errors was 6.45%) but slowly; the mean speed was 49.7 words per minute (wpm). According to the fluency norms published by Hasbrouck and Tindal (2006), average second-grade students (50^{th} percentile) read 51 wpm at the beginning of the school year and average fifth-grade students read 110 wpm. The participants in the study by Rashotte and Torgesen (1985) who read passages repeatedly gained more reading speed than those who read different passages $F(2, 12) = 45.74$, $p < .001$; Tukey's HSD $p < .01$. Word errors were also significantly fewer by the groups who read repeatedly than the group which did not $F(2, 12) = 7.35$, $p < .01$; Tukey's HSD $p < .01$. Between the two different types of repeated reading conditions, the group which read passages with shared words read more quickly than the group which read passages without shared words $F(2, 11) = 7.32$, $p < .01$, Tukey's HSD $p < .05$. Reading comprehension was not analyzed because the pretest mean was 3.5 out of 4, leaving little room for improvement.

Rashotte and Torgesen (1985) concluded that repeated reading of passages with a high degree of shared words is the most beneficial intervention for students with learning disabilities. Their results and conclusions should be interpreted carefully, however, due to the small sample size and short treatment duration. The researchers recommended that future research utilize a longer treatment and more rigorous comprehension measures.

Recently, Therrien et al. (2006) conducted research to measure the effects of combining repeated reading with a question-generation strategy. Their study was in response to empirical evidence that fluency predicts comprehension, but repeated reading and question-generation strategies alone were found to be insufficient to remediate reading problems, particularly fluency and monitoring of comprehension. The

participants of their study included 30 students between the fourth and eighth grades, 16 of whom had learning disabilities and 14 of whom had not been identified with learning disabilities but were reading at least two grade levels below their placement grade. The intervention consisted of 50 to 80 one-on-one sessions of 10 to 15 minutes in duration. The variability in amount of sessions is due to the fact that each student continued until he or she had read 50 passages. In each session, participants reread passages until they reached a pre-established number of correct words per minute (CWPM), were prompted to ask and answer questions about the text, and answered factual and inferential questions.

Therrien et al. (2006) measured the participants' broad reading abilities and oral reading fluency both before and after interventions occurred. Additionally, CWPM and the number of comprehension questions answered correctly were calculated at the end of each treatment session. At the end of the treatment, participants had significantly increased their reading speed by 22.16 seconds, $t = 6.91$; $p < 0.0005$. The treatment group increased their CWPM significantly more than the control group ($f_{1,27} = 5.70$; $p = 0.024$), with an effect size of 0.89. Although the percentage of factual comprehension questions answered correctly remained stable, the percentage of inferential comprehension questions answered correctly significantly increased from an average of 36.1 out of 40 to 38.9 ($t = 4.45$; $p < 0.001$). The growth on the measure of broad reading skills was not found to be statistically significant. The results have limited generalizability, however, due to the small sample size, particularly at individual grade levels. For example, only one eighth-grade student and six seventh grade students were included in the study. The majority of the students (23, or 77%) were in the fourth and

fifth grades. Additionally, there is no indication as to what the control group was doing during the intervention.

Allinder et al. (2001) focused on oral reading instruction for students with reading disabilities, contrasting specific strategies with generic encouragement to do well. The participants were 49 seventh-grade students in remedial reading classes, 15 of whom had been identified as having a disability. The instruction was provided by two classroom teachers and a speech-language pathologist. Students were randomly assigned to either the strategy group or the no-strategy group. Of the students who were encouraged to use strategies as they read, some chose their own strategies to use; others were told which strategies to use by their instructor. Strategies included reading with inflection, not adding words, pausing at punctuation, self-monitoring for accuracy, reading at an appropriate pace, watching with word endings, or tracking with finger, and were assigned based on knowledge of each student. The reading instruction included a component on comprehension, one on phonics skills, and a third on oral reading, and comprised three classes per week over 10 weeks. All of the students who participated performed slightly better on the passage comprehension posttest than on the pretest. On a silent, cloze-style test, students who were in the strategy group significantly outperformed the no-strategy group $t(47) = 2.39$, $p < .05$. There is little indication, however, if the gains measured are the result of the strategies or the increased amount of engagement with texts that resulted from the study.

A study by Alber-Morgan et al. (2007) attempted to address the lack of research on effective interventions for improving the reading fluency and comprehension of students with emotional and behavioral disorders (EBD). By using a case-study design,

Alber-Morgan et al. examined the effects of repeated reading with systematic error correction and performance feedback on the reading fluency and comprehension of four middle school students with EBD. The participants, two of whom were in sixth grade and two who were in seventh, attended an outpatient program for their behavior problems and had substantial deficiencies in reading performance as measured by their scores on state-wide assessments and teacher reports.

Independent Reading

Strategies to encourage students to read independently are considered essential for reading instruction by the California State Board of Education (CDE, 1999). Independent reading is linked to reading comprehension, vocabulary development, and fluent reading. In 1988, Krashen reviewed studies that evaluated the effectiveness of programs that encouraged independent reading, showing that the programs are equally or more effective than traditional, direct teaching. Included in the review were 20 studies of Sustained Silent Reading (SSR) and 25 studies on Self-Selected Reading programs. In SSR, teachers provide approximately 15 minutes every language-arts class for the students to read books of their choice. Teachers model free reading, and no responses to the books are required of the students. The studies on SSR dated from 1968 to 1985 with participants from the second grade through high school. The 20 studies on Self-Selected Reading programs, which differ from SSR only by requiring students to keep a record of and respond to their reading, date from 1937 to 1968 with participants from the first grade through the sixth.

Although Krashen (1988) did not conduct a meta-analysis of the studies he reviewed, he reported the results of the studies, 64% of which utilized comparison or

control groups. All of the studies on SSR compared the program to a comparison or control and either measured gains in reading comprehension or vocabulary. In all of the studies, the SSR group performed equivalent or superior to the comparison groups. Only 36% of the studies on Self-Selected Reading compared the program to a comparison or control, with all but two of the studies reporting the Self-Selected Reading program to be superior to the regular program when students' reading comprehension was measured. Of the 16 studies on Self-Selected Reading programs without control groups, all but one reported positive results. Krashen concluded that encouraging students to read independently contributes to success in reading comprehension.

The NRP, in its report of analyses of literature on reading skills (NICHD, 2000), acknowledged the strong correlations between encouraging students to read more and increased fluency and comprehension. Due to the fact that the inclusion critera for their meta-analyses was limited to experimental research published after 1991 and the panel was able to locate only 14 studies that programs designed to encourage independent reading, only after expanding the search beyond 1991, a meta-analysis was not completed of the studies in this area. Each study located was described rather than analyzed. The 14 studies dated from 1975 to 1999 with participants between the second grade and high school. The duration of the treatments reported in the studies was between 1 month and 5 years. The majority of the studies (8, or 57%) reported no difference between the treatment group and the control. The studies that did report an advantage for the program that encouraged independent reading were conducted on students between the fifth grade and high school. The NRP concluded that the research reviewed neither supports nor

negates the claims that encouraging students to read independently increases their reading abilities and that further research is warranted.

When Kuhn and Stahl (2003) reviewed research on reading fluency, they were critical of the NRP's lack of inclusion of correlational studies. Examples of neglected studies were of fifth-grade students who kept logs of their reading (Anderson, Wilson, & Fielding, 1988; Taylor, Frye, & Maruyama, 1990) and elementary students who were encouraged to read independently (Cunningham & Stanovich, 1991; Elley, 2000). All four studies reported positive results in terms of students reading achievement. The studies reviewed below were conducted after the publication of the report of the NRP. Included are two at the elementary-school level, and one that reviews a program called Accelerated Reader (AR) to increase students' independent reading. Others that were found that supported the use of increasing students' independent reading only reported anecdotal evidence and therefore were not included in the present review.

Two studies investigated the use of sustained silent reading (SSR) to encourage independent reading at the elementary-school level. In 2006, Kelly and Clausen-Grace conducted action research on one third grade class and three years earlier, Bryan, Fawson, and Reutzel (2003) conducted a study of three non-engaged readers in fourth grade. The participants in the study by Kelly and Clausen-Grace included students who were advanced readers as well as those who seemed to pretend to read during SSR. The participants' engagement during reading and reading comprehension were measured using a survey and a developmental reading assessment, which confirmed the teacher's informal observations that the participants were reading a narrow range of texts and exhibiting comprehension difficulties.

As a result of the data from the developmental reading assessment, Kelly and Clausen-Grace (2006) revised the SSR program to provide more teacher support through reading aloud, sharing reading experiences, and book talks. Student-participants kept logs of their reading to reflect their engagement. Reading time was structured to include time to reflect on what was read, as well as discuss texts. After 4 and then 7 months, the reading engagement survey was re-administered and results showed that the percentage of participants reading at the independent level had grown from 33% to 100% and comprehension difficulties had been reduced to the point that only 5% scored at the intervention level, down from 61% at pretest. The most important outcome from the change in SSR was found in the discussions participants had about books.

Bryan et al. (2003) randomly chose three fourth grade readers from seven who were observed by their teacher to be disengaged during SSR time to participate in an intervention aimed at increasing reading engagement using a multiple-baseline, across-subjects design. The baseline conditions were established through between five observations of the first participant, ten for the second, and 15 observations of the third in order to stagger the treatment across the students. The treatment consisted of five sessions of literary discussions in addition to SSR time (with the exception of one student who was absent on the last day), and participants were observed again for between five and 15 sessions. The literary discussions were provided by the researcher while the teacher continued to model silent reading.

From a visual inspection of the graph of off-task behaviors of the participants in the study conducted by Bryan et al. (2003), it is evident that all three participants were more engaged while reading during the treatment phase. Two of the three students

remained engaged following the treatment, whereas one had to receive two additional treatment sessions as a result of increased off-task behavior. Additionally, all three participants began reading much more quickly at the end of the intervention than at the beginning. Although the researchers acknowledged the lack of generalizability from a study of three students, they note that the improvements found may indicate that students can be encouraged to engage in the reading process through discussions of texts and adults showing interest in what they are reading.

Due to the popularity of the Accelerated Reader (AR) program for encouraging students to read independently, Groce and Groce (2005) surveyed 67 teachers regarding the degree and extent to which they use the program in their classes. In the program, students take a computerized pretest that determines a reading level. Students are subsequently provided with lists of words within their reading level from which to choose their independent reading texts. The program also creates goals for each student and includes computerized quizzes for each book listed. The results of the survey indicated that 75% of the teachers used the program as a focus of their reading instruction, but many of the teachers used the program differently. Regarding choice of books, 24% of the teachers did not allow their students to choose books that were below their reading level, while half of the teachers did not allow students to read above their reading level. Only 1% of the teachers reported that they use the computerized assessments with every student with every book; 16% of the teachers never used the assessments at all. One of the most common reasons given for not using the computerized assessments was the lack of higher-order thinking required in order to answer the questions.

Many teachers (70%) who responded to the survey on AR by Groce and Groce (2005) reported that they augment the program with projects that require students to interact with the texts more than the computerized tests. Over half of the teachers (54%) rewarded students who accomplished their AR goals. Although 50% of the teachers required their students to only read books on the AR list, some teachers expressed concern that the list limited students' choices. Groce and Groce concluded that although AR and other programs that increase the amount that students read independently positively affect reading skills, teachers should be thoughtful consumers of programs and augment programs like AR to create authentic tasks for readers and encourage sustained engagement with literature.

Section Three: Orthographic Conventions

Orthographic conventions are the constraints that regulate how words are spelled (Moats, 2000). Included are sound-symbol correspondences, constraints that regulate letter combinations like *dge* and *tch* to the end of words, those that forbid ending words in *v,* those that regulate the doubling of letters between syllables, and the changing of word endings with the addition of affixes. Although there are many studies that have calculated the correlations between the orthographic skills (often referred to as spelling skills) of proficient readers and those with learning disabilities (Badian, 2005; Compton, 2002; Hultquist, 1997), the focus of the current review is studies that explored correlations between knowledge of orthographic conventions and reading skills and those that investigated the effects of increased orthographic knowledge on reading skills. The correlational research reviewed includes studies with participants in preschool through the university level. The experimental research included in the review was conducted on

participants from preschool through the ninth grade, with the majority of research done with students at the elementary level. Both sets of studies are presented in order of grade level of participants.

Correlational Research

Badian conducted two longitudinal studies using correlations to examining the value of orthographic knowledge in predicting reading skills for elementary students. In the first study (1995), 92 students were followed between pre-school and sixth grade in order to determine which pre-school reading skills contributed most to later reading and spelling skills. Participants were initially measured on their intelligence, orthographic sensitivity, and visual motor skills. In first grade, they were administered a phoneme deletion task and two spelling assessments, one with real words and one with pseudowords. In the third grade, the pseudoword spelling test was re-administered, and reading comprehension and spelling were measured each year using a standardized achievement test. Word reading and vocabulary were tested with the same measurement at grades 1, 2, 5 and 6.

The finding of Badian's first study (1995) most applicable to the current study is that the two pre-school orthographic sensitivity tasks positively correlated with every reading and spelling measure at every grade level. The correlations between the reading, spelling, and vocabulary measurements and the pre-school letter-naming task were stastically significant at every grade level (p ranged from < 0.05 to 0.001) and the visual matching task at every grade level except for the reading comprehension measurement in first grade and the fifth-grade vocabulary measurement. Additionally, the letter-naming task most strongly correlated with the fifth-grade reading comprehension and spelling

tasks (0.52, $p < 0.001$) and the visual matching task most strongly correlated with the sixth-grade reading comprehension measurement (0.49, $p < 0.001$), indicating that the influence of orthographic skills increases with age.

Six years later, Badian (2001) replicated her findings with a second group of 96 children between pre-school and the third grade. A follow-up assessment was conducted with 79 of the students in the seventh grade. The purpose of the study was to re-examine the results of the previous study with a different group of students and to replace the phoneme-deletion task with non-phonemic phonological measures (rhyme detection and syllable segmentation). Rather than being assessed every year, this group was assessed in the first, third and seventh grades. Using stepwise and hierarchical regression analyses, the non-phonemic phonological measures were found to predict first-grade reading, but they were not useful long-term predictors. The orthographic tasks contributed significant variance to word reading and vocabulary at every level, increasing in added proportion of variance with grade-level.

The aim of a study by Kroese, Hynd, Knight, Heimenz, and Hall (2000) was to develop an instrument that could be used to assess phonetic and orthographic accuracy of the spelling of elementary students. The participants of the study were 119 children between the ages of eight and 12 with normal levels of intelligence ($\geq$ 85) and no neurological impairments. Complete data were only available for 78 of the participants, 34 of whom had reading disabilities (RD), 31 had ADHD, and 13 were diagnosed normal control children. The children were evaluated along cognitive, linguistic, academic, visual processing, visual motor, and behavioral measures, along with phonemic

awareness skills. An 8-point spelling scale was developed that assesses a misspelled word on a phonetic to an orthographic basis.

Among the findings of Kroese et al (2000), those that apply to the focus of the current study are the correlations between spelling and reading measures. The correlations between the spelling rating scale that Kroese and her colleagues had created and the standard assessment of reading were 0.75, $p < 0.001$. Correlations between the standardized assessment of spelling and the standardized assessment of reading were also calculated with a result of 0.76, $p < 0.001$. Consequently, not only did their rating scale prove reliable (correlation between the scale and the standardized measurement of reading 0.80, $p < 0.001$), but the findings indicate a strong relationship between spelling and reading skills as well.

The purpose behind a study of elementary students' spelling skills by Wilson, et al. (1999) was to investigate the relationships among word identification skills, spelling performance, and linguistic elements of words, including orthographic features, of elementary school students. The study was in response to evidence of high correlations between spelling and reading skills at the first-grade level and between word identification and reading comprehension in the elementary grades. The participants were 600 students in the first through sixth grades, 100 from each grade. The participants were part of the norming sample for the Kaufman Test of Educational Achievement, which has reading and spelling subtests. The words in the tests were analyzed in regards to linguistic elements, including orthographic conventions, as well as with each other.

The results of the analyses that Wilson et al. (1999) ran on their resultant data indicated that spelling and word identification are consistently correlated throughout the

elementary grades, from 0.81 in first grade to 0.78 in sixth grade, with lowest correlations at third (0.73) and fourth (0.75) grades. The linguistic elements that predicted word identification and spelling, however, were not consistent throughout the grade levels. Only for the fourth-grade measures were all linguistic elements related to both word identification and spelling. One limitation of the study, however, was that only correct spelling recognition was measured. Different linguistic elements may be more predictive of spelling production than those that were found by Wilson et al. to predict spelling recognition.

In 1989, Stanovich and West conducted two studies on whether orthographic processing could account for some of the variance in word recognition and spelling that is unexplained by phonological processing. In the first study, 61 university students were recruited to participate and were administered a spelling test with orthographically, and morphophonemically chosen words, along with exception words, a standardized test of spelling, and three measures of print exposure: the reading and media habits questionnaire, the author recognition test (ART), and the magazine recognition test (MRT). The results indicated that the ART was significantly correlated with both of the spelling measures (0.46 and 0.38, $p < 0.05$). Additionally, the spelling subtest that measured orthographically exceptional words had a significantly stronger correlation with the ART, $t(58) = 2.07$, $p < 0.05$.

In their second study, Stanovich and West (1989) built upon their previous results by examining whether print exposure contributed to orthographic processing skills independent of phonological processing. The participants, 180 undergraduate students, were administered a standardized measurement of word identification and passage

comprehension, the magazine recognition test (MRT) and the author recognition test (ART), a standardized spelling test and the experimental spelling test used in the first study, measurements of phonological processing and orthographic processing, and a word-reading task. The results of the analyses regarding the ART replicated that of the previous study: the ART and MRT both correlated with spelling ability (0.42 and 0.11 respectively) with a significant difference, $t(177) = 4.35$, $p < 0.001$. Additionally, all of the spelling measures were related to all of the reading measures with correlation coefficients ranging from 0.20 to 0.63 ($p < 0.05$). The orthographic measures were found to account for 6.7 % ($p < 0.01$) of the variance in word identification after the phonological measures had been partialled out. Stanovich and West concluded that exposure to print is a strong predictor of reading and spelling ability. It can also be concluded from their data that orthographic knowledge is a predictor of reading ability.

Experimental Research

The experimental studies reviewed below focused on improving students' orthographic knowledge for the purpose of increasing their reading skills. With one exception, the studies were conducted with students at the elementary level; Bhattacharya and Ehri (2004) included three high-school freshmen among the participants of their study of struggling adolescent readers. In the following studies, orthographic knowledge is represented as knowledge of the spelling of parts of words (Goswami, 1986; 1988), of the connections between sounds and letters (Ehri & Wilce, 1987; Santoro, Coyne, & Simmons, 2006; Uhry & Shepard, 1993), of the alphabetic principle behind English orthography (Berninger et al., 1999; Berninger, Vaughn, Abbott, Brooks, Abbott, Rogan, Reed, & Graham, 1998), and of the types of syllables and divisions between them

(Berninger, Vaughn, Abbott, Brooks, Begay, Curtin, Byrd, & Graham, 2000; Bhattacharya & Ehri, 2004).

Goswami (1986; 1988) conducted four studies in England on whether children use orthographic analogies when learning to read and if consistency of spelling-sound relationships had an effect on the use of analogies in reading. In 1986, Goswami studied 53 students in the equivalent of kindergarten, first, and second grade. The students were asked to read real and nonsense words that either shared letters in the same orthographic sequence, shared letters in a different sequence, or not at all (control) as a pretest. The participants were then asked to read the words again after being shown a clue word that was either analogous or non-analogous to the words in the list. Words were analogous in the beginning (for example, *beak-bean*) or the end of the word (for example, *beak-peak)*. The results indicated a significant interaction between the type of words, location of analogies and test, $F(4, 116) = 5.26$, $p < 0.001$, with a significantly larger improvement between pretest and posttest for the words that shared letters in the same orthographic sequence for both real words and nonsense words (p's < 0.01), independent of reading level. As a consequence, it appeared from the results that students at the first three levels of elementary school do use orthographic analogies for reading new words. This finding is significant because it indicated that children attend to parts of words when they read and apply that knowledge to new words.

Two years later, Goswami (1988) conducted three different studies replicating the earlier findings and expanding them to investigate whether the spelling consistency affects the ability of children to make analogies between words and whether analogies are used in reading prose. In the first study, 36 participants between the ages of five and six

read words that were analogous to clue words or shared letters or were different in the same manner as the study in 1986. For these subjects there was also a significant interaction between condition and word type, $F(4, 76) = 4.85$, $p < 0.005$. The words which were orthographically analogous were read more easily than those which shared common letters with the clue word or the control words.

Goswami (1988) then tested, trained and re-tested a group of 24 participants between the ages of six and seven. During the training, participants were taught to read orthographically analogous words which were either consistent in sound and spelling (for example, *peak-leak)*, consistent in spelling but not sound (for example, *peak-steak),* or unconnected (for example, *peak-loan).* On the posttest, there was a significant interaction between test and word type, $F(2, 84) = 60.02$, $p < 0.0001$. A post-hoc analysis (Newman-Keuls) showed that the number of words read correctly at posttest was significantly greater for all word types: analogous $p < 0.01$, ambiguous and unrelated $p < 0.05$, indicating that students can be taught to make orthographic analogies between words. There was also a significant interaction between the placement of the analogy, test, and word type, $F(2, 84) = 4.75$, $p < 0.005$. A post-hoc analysis revealed that more analogous words were read in the consistent spelling-sound condition than in the unconnected condition ($p < 0.01$), and in the unconnected condition than in the inconsistent condition $p < 0.01$. A limitation of the study is the fact that all participants received the same training, thereby creating a study with a lack of a control group.

The third study that Goswami conducted in 1988 was for the purpose of discovering whether children use analogies to read words in connected text. The participants were 39 children between the ages of six and seven who were given a pretest

and analogy-reading sessions. The session conditions differed regarding whether the story had a title containing a clue word from which analogies could be made, stories differed regarding whether the story repeated the clue word, and words were either analogous in the beginning, end, or merely contained common letters. The results of the analyses indicated that there was a significant interaction between condition, test, and word type $F(2, 70) = 9.27$, $p < 0.001$. Post-hoc analyses indicated significant improvement in participants' reading of both the words that contained analogies at the beginning and the end in the with-title condition: 0.82 versus 2.67 and 1.49 versus 3.36 respectively, p's < 0.01. Goswami concluded that, not only do beginning readers use orthographic analogies to learn new words, but that the results of single-word experiments are similar to those using connected prose.

More recently, Santoro et al. (2006) conducted an experimental study on increasing spelling skills for the purpose of increasing reading abilities of 116 monolingual, English-speaking students in kindergarten who were at risk for a reading disability. The basis for their study was correlational research that supports the connection between spelling and reading skills. Participants were determined to be at risk for a reading disability based on their performance on measures of phonological awareness and letter naming and teacher recommendations. Participants were randomly assigned to a group that received a spelling intervention focusing on sound-symbol correspondences, one that received instruction in building vocabulary and reading comprehension through a read-aloud approach or a control group that received a commercial reading module with an emphasis on beginning-reading skills. All groups received 108 sessions of 30 minute duration in groups of five. At the beginning and end

of the treatment, participants were measured on their reading fluency (for both real and nonsense words), spelling, letter writing, word attack, and word identification skills.

When Santoro et al. (2006) analyzed the results of the posttest measurements, they found that the spelling group outperformed the storybook group on word attack (d = 0.62-1.30, for different levels), word identification (d = 0.76-1.28, for different levels), letter dictation fluency (d = 0.74), and spelling (d = 0.80-2.28 on three different measures). The spelling group outperformed the control group on nonsense word fluency (d = 0.82), word attack (d = 0.72-1.40, for different levels), word identification (d = 0.76-1.28, for different levels), letter writing fluency (d = 0.73), and spelling (d = 0.6). The results indicated that spelling intervention did increase students' reading skills.

Using an experimental design, Ehri and Wilce (1987) studied whether teaching beginning readers to produce phonetic spelling improves their ability to read words. The participants were 24 monolingual, English-speaking kindergarten students from two elementary schools. The students were chosen from a total of 63 students who were given several pretests because they could name or give the sounds but could not spell of at least 9 out of the 10 target letters to be used in the training. The pretests included an assessment of letter name and sound knowledge, the *Peabody Picture Vocabulary Test,* and an assessment of nonsense word spelling. The students were first paired on the basis of their scores on the pretests, then randomly assigned to either the comparison or the experimental group.

Although both groups in the study by Ehri and Wilce (1987) received a treatment that involved individualized tutoring over a period of 36 days, the students in the experimental group received instruction in spelling nonsense words, whereas the

comparison group's instruction consisted only of matching isolated letters to sounds. The students received 7 to 18 training sessions, each lasting between 15 and 40 minutes. There is no explanation for the variance in amount and duration of training sessions or its affect on the study's results. At the end of the training sessions, all students were given a series of posttests, including a word-learning task, a repetition of the nonsense-word spelling assessment, a spelling recognition test, and an assessment of phonemic segmentation. Ehri and Wilce did not include any information regarding how the assessments were constructed nor reliability or validity results.

Before the results were analyzed, four subjects were eliminated: two from the experimental group because they did not attain sufficient spelling skill during the training and two from the comparison group because their spelling growth was considerably more than that of the rest of the comparison group. The analyses were run both with and without the subjects included to determine that their exclusion did not affect the results. To ensure that the remaining subjects did not differ in any way other than their training, a one-way analysis of variance (ANOVA) was conducted on their scores on the pretest measures. The groups did not differ significantly.

The results of the ANOVA conducted on the scores of the printed word learning posttest indicated that trained subjects outperformed comparison subjects, and that scores increased with practice; there was a significant main effect for both treatment $F(6, 108) = 5.12$, $p < 0.05$ and trials $F(6, 108) = 7.13$, $p < 0.01$. On the nonsense word spelling task, the experimental group outperformed the comparison group ($t = 5.46$, $p < 0.01$). On the spelling recognition task, there was a main effect for treatment $F(6, 108) = 22.75$, $p < 0.01$, word type $F(6, 108) = 36.15$, $p < 0.01$ and an interaction effect $F(6, 108) = 6.64$, p

< 0.05. Lastly, the experimental group outperformed the comparison group on the phonemic segmentation task as well $F(6, 108) = 21.51$, $p < 0.01$.

Ehri and Wilce (1987) concluded that spelling instruction was found to improve children's ability to learn to read a set of similarly spelled words. Limitations of the study include the fact that phonetic spellings were used rather than real spellings and the small sample size and consequent effect on generalizability.

Two sets of researchers conducted studies on the use of spelling instruction to increase the reading skills of first-grade children struggling to learn to read. In 1993, Uhry and Shepard replicated the study by Ehri and Wilce (1987) with older students, exploring the effect of spelling instruction on oral reading and comprehension, and Berninger, et al (1999) investigated the differential effectiveness of instruction on whole words or orthographic parts of words. Twenty-two first-grade students from an independent school participated in the study by Uhry and Shepard (1993). The participants were assigned randomly to two treatment groups with three levels of strata based on teachers' recommendations of reading potential. The treatment lasted for 6 and a half months, during which each group received two 20-minute sessions per week in groups of 5 or 6. The treatment group received training on segmenting words into sounds and spelling; the control group studied the same groups of words by learning to read them by sight. Measurements of nonsense word reading, word identification, oral passage reading, silent reading comprehension, segmenting, blending, and spelling were taken before and at the completion of the intervention, with measurements of nonsense word reading, word identification, and oral passage reading repeated after every 8 weeks.

Uhry and Shepard (1993) found that the trained subjects significantly scored higher on nonsense words, sight word lists, oral reading fluency, spelling, and segmenting than the control group. Group differences in reading comprehension, however, were not significantly different from pretest to posttest. A possible explanation offered is the youth of the participants and the lack of time for them to gain fluency with the words learned. Limitations to the study include the fact that the sample was drawn from an independent school before which most of the students had attended 3 years of pre-school. Additionally, the mean intelligence of the sample was one standard deviation above the mean (122.5).

In the study by Berninger et al. (1999), the participants were 48 students in the first grade who had been identified by their teachers at the end of the year as having difficulties in reading. Their purpose was to investigate whether students could learn the alphabetic principle behind English orthography without explicit instruction in rules of sound/symbol correspondence. The participants were assigned randomly to one of three treatment groups: whole word, in which participants read words on cards and were given the pronunciation and letters for words they did not know; sub-word, in which the words that the participants read were colored by spelling unit and instruction included the grouped sounds (blends or digraphs) blended to make the whole word; and combined, in which participants received both procedures. The eight individual half-hour tutoring sessions took place at a university near the students' elementary school and included 20 minutes of word-strategy instruction and 10 minutes of oral reading once or twice a week for each student. Pre, mid, and posttests included measurements of intelligence,

phonological deletion and segmentation, orthographic recognition, rapid naming, word identification, word attack, and a reading inventory of 48 the words taught.

The results of the posttest measurements indicated that the total sample improved on all measures: $F(2, 82) = 46.96$ for word identification, 13.92 for word attack and 136.14 for the measurement of taught words, $p < 0.001$. The sub-word method was significantly more advantageous than the other methods in regards to word identification $F(2, 82) = 3.94$, $p < 0.0232$. Berninger et al (1999) concluded that the orthographic knowledge can be taught implicitly. The study lacked a control group, however, and results from individualized tutoring sessions in a university setting may not be generalizable to students in public schools.

Studies by Berninger et al. (1998) and Graham et al. (2002) were conducted in order to investigate whether there is a causational relationship between spelling and reading for second grade students, given the evidence of a correlational relationship. In 2000, Berninger et al. conducted a follow-up to their 1998 study in which they continued to monitor the previous study's participants who had performed well in second grade and tutor those who had not during their third-grade year of elementary school. In all three studies, participants received spelling instruction and were measured on their reading performance. All three studies found evidence that increasing second-grade students' spelling skills resulted in increased reading word identification skills.

In their first experimental study on increasing the spelling skills of second-grade students, Berninger, et al. (1998) sought to contribute to the knowledge base regarding the remediation of spelling difficulties. At the same time, their study was an exploration of the effect of spelling knowledge on reading skills. The participants of their study were

128 students in the second grade who had been identified as poor spellers on the basis of group and individual screening of spelling skills. Participants were assigned randomly to one of eight treatment groups: whole word, in which participants read words on cards and were given the pronunciation and letters for words they did not know; phoneme-letter(s), in which tutors pronounced and pointed to each letter on the card before reading for the student; onset-rime, in which tutors explained about word families and taught the words with the onsets and rimes as separate units; each two-way combination of the three single approaches, the three-way combination of all approaches or a control group. Participants received training in pairs for 24 20-minute sessions held twice weekly. All of the treatment groups were trained in the alphabetic principle and 48 words, using one of the experimental conditions for making connections between spoken and written words.

The participants in the study by Berninger et al. (1998) were assessed using standardized measurements of spelling, word identification, and writing. All of the participants increased in their word recognition as a result of the intervention $F(1,119) = 27.35$, $p = 0.001$. In their efficacy for increasing spelling skills (comparisons of treatments' effects on reading skills were not made), all of the treatments resulted in a significantly higher increase in participants' spelling skills than the control situation $F(1, 119)$ between 4.39 and 9.58, $p \leq 0.05$, with the exception of the combination of the whole word and onset-rime condition, which resulted in 15.98, $p \leq 0.001$. As a consequence, it seems that the more connections that are taught between spoken and written words, the more connections are made within the learner to transfer to other contexts.

The study of second-grade spelling by Graham et al. (2002) was also a response to the lack of experimental evidence supporting the strong correlations between spelling and reading skills. Of the 291 students in the second grade attending four different schools who were screened for spelling skills, 66 were identified as poor spellers as the result of a district-wide assessment of spelling and teacher recommendations. A total of 60 students returned consent forms and participated in the study. The participants were divided randomly into two groups: one that would receive a spelling intervention and one that would receive additional instruction in math. Twenty-three of the participants had previously been identified by the school district as having a disability: 12 with speech and language difficulties, 5 with learning disabilities, 3 with ADHD, 2 with emotional disturbance, and 1 with developmental disabilities. The treatment lasted 6 months and consisted of 48 20-minute sessions conducted three times each week supplemental to regular instruction. The spelling treatment consisted of eight units of six lessons focusing on spelling patterns, including the orthographic conventions of syllable types, the spelling of the /k/ sound at the end of a single-syllable word, and the doubling rule for adding suffixes, taught via word-sorting, word-building, and peer-practice activities. The mathematics treatment, which served as a control, was also divided into eight units of mathematics skills.

The measurements used as pre- and posttests, as well as a 6-month measure of maintenance, by Graham et al. (2002) to calculate growth in spelling and reading skills were standardized tests of spelling, writing fluency, story construction, word identification, and word attack. The results from only 54 participants were reported due to attrition. On all measurements of spelling, including the maintenance measure after 6

months, the group that received the spelling intervention outperformed the math group $t(28) = 25.7$ and 15.07 respectively, $p = 0.00$. The results most relevant to the current study were the results of the reading measures. At posttest, the word attack skills of the group that received the spelling instruction had improved significantly more than the math group, with an effect size of 0.82. The word identification skills, however, had declined slightly for both groups. Six months later, the word-attack gains were not replicated, although they did not decrease. For those who had the poorest word identification skills, however, students in the spelling condition outperformed those in the math condition on the maintenance measure.

In 2000, Berninger, Vaughan, Abbott, Brooks, Begay, Curtin, Byrd, and Graham conducted a two-part study of the maintenance of the students who had responded quickly to the spelling interventions employed in the study by Berninger et al. in 1998. The students who responded slowly continued to receive tutoring, during which Berninger et al. (2000) compared the relative effectiveness of alphabetic principle training only and combined alphabetic principle and syllable awareness training. They also investigated how much practice with specific words is needed in order for the words to become represented and retained in long-term memory. Of the 64 children who had not yet reached grade level in spelling after the intervention of the previous study, the first 32 to return consent forms were divided into two groups for continued tutoring: one that only focused on the alphabetic principle (the control) and one that added syllable awareness training with polysyllabic words. Both groups received training in 20-minute sessions twice weekly for 6 to 8 weeks. Participants in both treatment groups improved in their spelling, word identification, and phonological memory. More importantly, there

was a significant effect for the amount of word-specific practice and short-term retention of taught words $F(2,60) = 92.972$, $p = 0.0001$, with the greatest accuracy for words that had been practiced 24 times.

In the second part of the study by Berninger et al. (2000), a new sample of 47 poor spellers in third grade received 24 20-minute training sessions in either the alphabetic principle alone or with syllable awareness training added. The results of the analyses suggested that knowledge of the alphabet principle alone can lead to gains in spelling achievement but that repeated practice in spelling dictated words in writing is also needed to reach short-term mastery levels for specific words, and explicit training in syllabic awareness may also be helpful and refine spelling skill.

In 2004, Bhattacharya and Ehri also found syllable awareness to contribute to spelling and reading abilities of adolescents. The purpose of the study was to examine the effect of syllable instruction on reading and spelling skills. The participants were 60 students in grades six through nine who attended remedial reading classes and were assigned randomly to three treatment groups: one that received training in graphosyllabic analysis, one that practiced reading whole, multi-syllabic words, and a control group. The treatments consisted of four individual 30-minute sessions, for which participants were removed from their regular instruction. During the graphosyllabic treatment, participants were trained in dividing words into syllables and re-blending the syllables into the whole word, after discussing its meaning. The participants in the whole-word group practiced reading words and discussing their meanings. As pretests and posttests, participants were measured on their word attack skills, word learning, and spelling. At

the completion of the treatment, participants were also measured on their letter knowledge, word identification skills, and syllable segmentation ability.

The data collected by Bhattacharya and Ehri (2004) indicated that graphosyllabic instruction helped students to read words more efficiently than the control group $p < 0.01$. All reported effect sizes for the graphosyllabic analysis group ranged from 0.63 (on pseudoword reading) to 1.66 (on circling syllables). In contrast, the effect sizes for the whole-word group ranged from -0.02 (on circling syllables) to 0.77 (on spelling treatment words). The effects of instruction were greater for the students who were initially reading at the equivalent of third-grade level than for those who were reading between the fourth- and fifth-grade levels $p < 0.01$. There was a significant main effect of treatment for the students who read at the third-grade level $F(2, 18) = 5.91$, $p < 0.05$, but not for those at the fourth-fifth grade level. The results support instruction in segmentation of words into syllables, particularly for students at the lowest reading levels. Limitations of the study include a lack of indication as to what, if any, intervention the control group received and the short duration of the treatments.

Section Four: Morphological Awareness

Morphological awareness, along with awareness of grammar and other linguistic features, is critical to the development of word reading and reading comprehension (Carlisle, 2003). Morphological awareness is the awareness of the morphemic structure of words, suffixes, prefixes and roots, and the ability to reflect upon and manipulate that structure (Carlisle, 1995). Many researchers have studied the development of morphological awareness, its correlation with other skills, and strategies for developing students' morphological skills with the aim of increasing their reading and spelling skills.

The current review will first present findings from a longitudinal study on morphological awareness and early reading achievement (Carlisle, 1995) and a descriptive study on students' morphological knowledge at different grade levels (Nagy, Diakidoy, & Anderson, 1993). The remainder of the section will be divided between correlational studies of morphological awareness and reading skills and experimental studies, presented by grade level of participants.

In her longitudinal of study of students from kindergarten through the second grade, Carlisle (1995) sought to explore the relationship between morphological awareness and reading achievement, as well as the growth of morphological awareness between kindergarten and first grade. Participants initially included 154 students in kindergarten without identified disabilities. Due to attrition (likely due to the depressed economy of the area), data from 84 of the students were included in the analysis that occurred while the students were in the second grade. Participants were measured on their vocabulary, grammar knowledge, and ability to produce or recognize morphemes in kindergarten. In the first grade, the participants were measured on their phonological awareness and ability to produce or recognize morphemes. In second grade, participants were administered standardized tests of reading comprehension and phonetic analysis.

After computing correlations and regression analyses, Carlisle (1995) found that, although the participants' performance on morphological awareness tasks were related to their vocabulary and grammar knowledge in kindergarten (correlations of 0.48 and 0.47, respectively) morphological awareness at the kindergarten level did not add to the prediction of second-grade reading achievement beyond that of vocabulary and grammar knowledge. The results of the analyses of the first and second-grade assessments

indicated that morphological awareness at the first-grade level may be more strongly related to second-grade reading comprehension than fist-grade phonological awareness (Beta = 0.366, p = 0.004 and 0.175, p = 0.105 respectively). It was also found that there was significant growth in the participants' morphological awareness between the first assessment in kindergarten and the second in first grade, t (114) = 9.46 $p < 0.001$. As a consequence, the results of the study indicated that not only is there a relationship between morphological awareness and reading, but that morphological awareness is greater in first grade students than those in kindergarten.

Six years prior to the study by Carlisle (1995) on the morphological awareness of elementary school students, White et al. (1989) investigated the prevalence of words with prefixes at various reading levels and the knowledge of third- and fourth-grade students of morphological features (prefixes, suffixes, and root words). Their study was in response to the lack of empirical support in the literature for morphological teaching, and the fragmentary evidence available of the role that morphological knowledge plays in vocabulary development. In their first investigation, White et al. sampled words that had the prefixes *un, re, in/im/ir/il* and *dis* from a corpus for intermediate grades. They found that an analysis of suffixed words could produce incorrect meanings 40% of the time and that the number of analyzable words per million words of texts increased with grade level. Approximately 80% of the words sampled had suffixes, with 61% of the suffixes inflectional, 39% derivational.

White et al. (1989) used the affixed words they sampled to measure the morphological knowledge of 46 private-school students in the third grade and 45 in the fourth grade. The participants took a test of vocabulary with the root words and were

asked to identify suffixes in a list of suffixed words. The results indicated that fourth grade students knew more than half of the root meanings sampled, but the third graders did not, with a significant difference $F(1, 89) = 23.51$, $p < 0.001$. The non-neutral suffixes, those that cause changes in pronunciation of the base word, were less likely to be recognized than inflectional suffixes or neutral derivational suffixes $F > 80$, $p < 0.01$ for both grades. The conclusion was that morphological knowledge increases with age, and that non-neutral suffixes may need to be taught.

In 1993, Nagy et al. explored the development of knowledge of derivational suffixes of fourth, seventh, and high-school students in order to investigate the progression of morphological knowledge. The 630 participants included 200 fourth-grade students, 117 seventh-grade students, and 30 students in high school. The assessment was a test of suffixed words and stem words that measured whether participants could identify the correct usage of the words. When the results were analyzed, there was a significant main effect for grade, $F(2, 627) = 41.5$, $p < 0.001$, and a significant grade x suffixation interaction, $F(2, 627) = 10.3$, $p < 0.001$. Fourth-grade participants scored lower than the seventh-grade participants and the high-school participants on both the stem and derivative items, with a wider gap between their performance on the two types of items. The difference between the performance of the seventh-grade participants and the high-school participants was not significant. When a regression analysis was conducted to examine the relationship between morphological knowledge and reading skills as measured by standardized test results available in school records, the reading skills of all of the participants were significantly related to their performance on the derivative items, even when controlled for performance on stem

items. The results indicated that although morphological knowledge is important for reading abilities at every level measured, the majority of growth in students' knowledge of derivational suffixes occurs between the fourth and seventh grades.

Correlational Research

In 1993, Carlisle and Nomanbhoy conducted a study in order to investigate the extent to which phonological awareness contributes to the morphological awareness of first-grade students and to determine the extent to which phonological awareness and morphological awareness account for variance in word reading. The participants were 101 monolingual English-speaking students in the first grade. The assessments included a judgment of word relations task that asked students if affixed words were related to stem words, a production of word forms task that required participants to add suffixes to stems, a word-reading test, and a measure of phonological awareness. The results from the analyses of the data that are most applicable to the current study are those that indicated that phonological awareness contributed more to the reading abilities of the participants than morphological awareness (correlation coefficients of 0.47 for phonological awareness versus 0.07 for the judgment task and 0.22 for the production task). Together, however, participants' performance on the phonological awareness and morphological awareness tasks accounted for 37.2% of the variance in reading $F(3, 97) = 19.130$, $p < 0.001$. Morphological awareness alone accounted for a small but significant amount of the variance (4%). As a consequence, morphological awareness may not be as influential a factor in the reading of first-grade students as it is for students who are older.

Second-grade students at-risk in reading and fourth-grade students at risk in writing were the focus of a study by Nagy et al. (2003) on the relationship of

morphology, along with oral vocabulary, phonology, and morphology, to other literacy skills. The study was a response to the lack of research on creating programs for students at risk of not meeting standards in reading and writing but who do not necessarily qualify for special-education services. The participants were 98 second-grade students who had failed an oral-reading assessment at the beginning of the school year and 97 fourth-grade students who had failed a writing assessment administered at the beginning of the school year. Participants were assessed on a test of phonological awareness, an orthographic matching task, orthographic selection, a suffix choice test, a word combination task, a derivation decision task, a test of pseudo word reading efficiency, decoding tests, a spelling inventory, and standardized tests of vocabulary, word identification, word attack, spelling, reading comprehension, written expression, and writing fluency.

Complete data were available for only 95 of the second-grade participants and 94 of the fourth-grade participants whom Nagy et al. (2003) assessed. The correlations between the morphological measures and reading assessments for the second-grade participants were significant ($p < 0.05$, correlation coefficients ranging from 0.20- 0.48) with the exception of the relationships between the compound structure test and the morphological relatedness task and the measurement of word identification. The results of a structural equation model of the data from the second-grade participants indicated that the morphological factor significantly predicted reading comprehension (0.69, $p < 0.05$). The correlations between the morphological measures and reading assessments for the fourth-grade participants were significant ($p < 0.05$, correlation coefficients ranging from 0.20- 0.47) with the exception of the relationship between the morphological relatedness task and the measurement of word attack. The results of a structural equation

model of the data from the second-grade participants indicated that the morphological factor significantly predicted reading comprehension (0.80, $p < 0.05$), as well as orthographic knowledge ($r = 0.58$). Consequently, for the fourth-grade participants, who scored higher on the measurements of morphological knowledge than the second-grade participants, morphological skills are emerging and gaining importance in reading skills.

Morphological awareness is based on the ability to parse words and analyze constituent morphemes for the purpose of constructing meaning. Carlisle (2000) conducted a study to determine whether morphological awareness is related to reading achievement, particularly the reading of derived forms and reading comprehension. The participants were 34 third-grade students and 25 fifth-grade students at a private day school, none of whom scored below the 30th percentile on the Comprehensive Testing Program. Students were given a word reading test, a test of morphological structure, which included the decomposition of derived words to complete sentences and the production of a derived word in order to finish a sentence, a test of vocabulary knowledge that includes sentence creation with words, and the vocabulary and reading comprehension subtests of the Comprehensive Testing Program, which is multiple-choice format.

The results of the analyses Carlisle (2000) conducted on the data indicated that the fifth-grade students performed significantly better on the measurements of morphological awareness, $t(58) = 4.36$, $p < 0.001$, than the third-grade participants. Additionally, there was a significant relationship between the morphological awareness test and reading comprehension for fifth-grade students ($r = 0.69$, $p < 0.001$), but not for third-grade students. For the third-grade participants, the three morphology tests

accounted for 43% of the variance in reading comprehension, $F(3,30) = 7.42$; $p < 0.001$; for the fifth-grade participants, the morphology tests accounted for 55% of the variance in reading comprehension, $F(3,21) = 8.68$; $p < 0.001$, with the test of morphological structure making the only significant contribution of 13.7%. Results from this study, however, may not generalize to students in public schools or with lower reading abilities.

In multiple investigations, Mahony et al. (2000) examined the influence of morphological relatedness on decoding ability in comparison to other factors that contribute to reading skills in students between third and sixth grade and Singson et al. (2000) examined children's awareness of the syntactic properties of derivational suffixes. The participants of both studies were 98 students in grades three through six who were native speakers of English without speech or hearing deficiencies or identified learning differences. The participants were given an intelligence test, a morphological relatedness test (both a written version and an oral and written version), standardized word identification, word attack and vocabulary tests, and a test of derivational suffix test (both a written version and an oral and written version).

Mahony et al. (2000) analyzed the results of the intelligence test, morphological relatedness test (MRT), and standardized tests of word identification, and word attack skills. The overall scores for the MRT and the standardized reading tests improved significantly with grade level. The partial correlations that controlled for the effect of vocabulary knowledge indicated significant relationships between the MRT and the standardized measurements of word attack skills ($r = 0.30$ for written and 0.33 for oral and written, $p < 0.001$) and word identification ($r = 0.32$ for written and 0.33 for oral and written, $p < 0.001$). Partial correlations controlled for the effect of the MRT between the

vocabulary measure and word attack skills were not significant; those for word identification were ($r = 0.25$, $p < 0.015$). Consequently, not only did morphological knowledge improve with grade level, but morphological knowledge contributes to word attack skills as well.

Singson et al. (2000) considered vocabulary and short-term memory as factors that might be responsible for any relation between knowledge of derivational suffixes and decoding ability. They analyzed the same students' performance on measures of word attack and word identification compared to their performance on the derivational suffix test (DST) and intelligence measures. They found that performance on the DST increased along grade levels, but particularly so between grades three and four. The correlations between the DST and word identification were higher for real words than nonsense words in the written condition ($r = 0.76$ and 0.61, respectively, $p < 0.001$) and higher than the written and oral condition ($r = 0.58$ and 0.47, respectively, $p < 0.001$). The moderate correlations indicate a relationship between knowledge of derivational suffixes and oral reading.

In the second investigations conducted by Mahony et al. (2000), and Singson et al. (2000), a separate group of 101 English-speaking third- through sixth-grade students without disabilities were administered the same battery of tests as in the previous investigation, but were also administered the Auditory Analysis Test to measure phonological awareness. The analyses conducted by Mahoney et al. (2000) on the morphological relatedness test (MRT) replicated the previous results, adding a condition in which the MRT was administered orally, without written cues. Morphological awareness only contributed 5% of the variance in reading ability, when controlled for

phonological awareness. Singson et al. (2000) replicated their previous findings that the derivational suffix test was significantly correlated with reading. Morphological awareness was found to offer a separate contribution to reading performance above and beyond what is furnished by vocabulary and phonological skills (4%). The conclusion of all four investigations is that morphological awareness does contribute independently to reading skills.

Fourth- and sixth-grade students were the focus of a study by Carlisle and Katz (2006) in which the goal was to examine whether the frequency of derived words affects the accuracy with which the derived words are read. The participants were 79 fourth-grade students and 73 sixth-grade students from three elementary schools in the Midwest. All participants were monolingual English speaking without any identified disabilities. The measurements included a standardized assessments of vocabulary, word identification, word attack, passage comprehension, and a measurement of reading complex (multisyllabic or morphologically complex) words. The results indicated a significant relationship between the measurement of reading complex words (RCW) and the test of word identification (0.90 for fourth-grade students and 0.86 for sixth-grade students), word attack (0.86 and 0.82, respectively), and passage comprehension (0.68 and 0.56 respectively). The results of a factor analysis indicated that morphemic composition of words and experience with the words and word families accounted for 41% of the variance in the participants' reading of the complex words, $p < 0.001$. Word frequency was not found to affect students' reading of complex words.

Middle-grade students between the fourth and ninth grades were the focus of a study by Nagy et al. (2006) on the contribution of morphological awareness,

phonological memory, and phonological decoding to reading comprehension, vocabulary, spelling and reading fluency. Their purpose was to further understand the complex relationship between morphological awareness and reading skills, distinct from phonological skills. The participants were 96 fourth-grade students, 86 fifth-grade students, 116 sixth-grade students, 102 seventh-grade students, 105 eighth-grade students and 102 ninth-grade students in a predominately White, suburban school district in the northwestern United States. All of the students in the general education classes at the participating school were a part of the study. Measurements included measures of morphological awareness: a suffix choice test and a morphological relatedness test, measures of phonological awareness: an oral nonwords repetition test that measures phonological short-term memory and a pseudoword reading test, and literacy measurements, including standardized tests of vocabulary, reading comprehension, and spelling, and measurements of reading fluency of inflected words, prefixed words, and sets of morphologically related words.

For the purpose of observing linear trends in the data, Nagy et al. (2006) grouped the results of the measurements by combining pairs of adjacent grade levels (fourth and fifth, sixth and seventh, eighth and ninth). According to an inspection of the means and standard deviations for each measure, performance on the morphological tasks increased significantly with grade level. Correlations among the morphological and phonological tasks and vocabulary were significant at all grade levels, with stronger correlations for the morphological tasks. For the morphological tasks and vocabulary, correlations decreased slightly with grade level: for fourth- and fifth-grade students, $r = 0.83$, sixth- and seventh-grade students, $r = 0.72$, and eighth- and ninth-grade students, $r = 0.67$. The correlations

between morphological measures and reading comprehension also decreased with grade level: for fourth- and fifth-grade students, $r = 0.76$, sixth- and seventh-grade students, $r = 0.65$, and eighth- and ninth-grade students, $r = 0.59$. A structural equation model revealed that morphological awareness contributed significantly to vocabulary and reading comprehension at all three grade levels, with total effects of 0.85 for grades four and five, 0.72 for grades six and seven, and 0.67 for grades eight and nine for vocabulary (significant at $p < 0.001$), and total effects of 0.76, 0.65 and 0.58 respectively for comprehension (significant at $p < 0.05$).

The results of the analyses done by Nagy et al. (2006) replicated and expanded upon previous research on the contribution of morphological awareness to reading comprehension. In their study, not only was morphological awareness found to contribute to reading comprehension through vocabulary, but to make a unique contribution as well, possibly due to the higher levels of morphological awareness associated with higher levels of reading fluency as well as the syntactic information inherent in morphemes. These results are particularly relevant for the current study, which will seek to improve students' reading fluency levels via morphological instruction with the aim of increasing their reading comprehension.

Carlisle and Stone (2005) included ninth-grade students as well in their studies of the role of morphemic structure on the reading fluency of elementary, middle, and high-school students. The purpose of the studies was to gain a better understanding of the role of morphology in reading at different educational levels. In the first study, the participants were 39 second-and third-grade students and 33 fifth- and sixth-grade students who scored 80 or higher on a standardized assessment of receptive vocabulary

and 90 or higher on a standardized assessment of word identification skills. The word-reading tasks were administered via a computer that measured the speed and accuracy of the participants' responses to nonverbal symbols, high-frequency derived and pseudo-derived words, and low-frequency derived forms of high-frequency base words. The analyses of the results indicated that the older students read all of the words significantly more accurately and quickly than the younger students, $F(1,70) = 27.26$, $p < 0.001$ (partial eta squared of 0.28) and $F(1,70) = 20.09$, $p < 0.001$ (partial eta squared of 0.26), respectively. All of the students read the real words significantly more accurately than the pseudo-derived words, $F(1,70) = 26.68$, $p < 0.001$ (partial eta squared of 0.28). The results of a post-hoc analysis of the results of the analysis of the participants' reading speed, however, indicated that although the younger participants read the real words significantly more quickly than the pseudo-derived words, there was no significant difference for the older students. The word length and frequency of the words were analyzed and it was found that neither accounted for the participants' greater accuracy reading the derived words than pseudo-derived words.

In their second study, Carlisle and Stone (2005) sought to determine whether the speed and accuracy of middle- and high-school students' reading of derived words was affected by the phonological transparency of the words. In order to do so, they measured the reading fluency of 15 middle-school students (between the ages of 10 and 12) and 18 high-school freshmen (between 13 and15 years old) who scored 80 or higher on a standardized assessment of receptive vocabulary and 90 or higher on a standardized assessment of word identification skills. Using computerized measurements, participants completed the same non-verbal measurement as the elementary participants, a word-

reading task of morphologically derived words that were either phonologically transparent (*culture-cultural)* or opaque (*nature-natural)*, and a lexical decision task in which participants were required to decide whether a string of letters with a suffix was a word or a pseudo-word. The results indicated that both groups read the phonologically transparent words significantly more quickly and accurately than the opaque words (partial eta squared of 0.55), regardless of the length or frequency of the words. All participants also chose transparent derived real words on the lexical-decision task more accurately than phonologically opaque words (partial eta squared of 0.30);. As a consequence, it appears that, although morphological awareness influences reading fluency, phonological features of the words may be a moderating variable.

Experimental Research

In 2000, Arnbak and Elbro responded to the lack of experimental research on the effects of morphological awareness training on reading and spelling skills by studying a group of 60 elementary-school children in Denmark. The purpose was to build upon the correlational research showing a relationship between morphological awareness and literacy skills. The participants of the study were 60 students in the fourth and fifth grades who had been identified by their teachers as reading at least 2 years below grade-level. All of the participants received training in reading remediation, including phonological awareness, sound-symbol correspondence, spelling, and reading. The treatment group of 33 participants received oral training in the semantic aspects of morphemes for 15 minutes a day, three days a week for 12 weeks (resulting in 36 sessions) while the 27 participants in the control group continued to receive reading remediation training. Pre- and posttests included measurements of oral morphological

awareness, including morpheme deletion, analogy and compounding; phoneme identification, vocabulary, grammatical knowledge, memory, intelligence, spelling, and reading measures including passage comprehension, word identification, pseudoword reading, and reading words of different morphological structure

The analyses of the data collected by Arnbak and Elbro (2000) indicated that the treatment group, which had received training in morphological awareness, gained more on the morphological awareness assessments than the control group. Additionally, the treatment group significantly gained more than the control group on the measure of passage comprehension ($p < 0.05$). One factor that may have influenced the results of the study was the uneven levels of intelligence of the two groups: the treatment group had a mean intelligence percentile of 53, whereas the control group's mean percentile was 42.

Using a quasi-experimental design incorporating quantitative and qualitative data, Baumann et al. (2002) explored the effects of instruction in morphemic analysis and contextual analysis individually and together on the abilities of fifth-grade students to recall meanings of instructed words, to infer the meanings of uninstructed words, and to comprehend texts. There were originally 92 students in the study, but the final sample consisted of 88 participants due to attrition. All of the fifth-grade classes in the school participated in the study. The classes were thus intact groups, but other than the control group that was taught by a researcher-participant, the classes were assigned randomly to the various treatments.

There were four intervention groups of similar size: (a) students who only received instruction in morphemic analysis (MO; $n = 24$), (b) students who only received instruction in contextual analysis (CO; $n = 22$), (c) students who received instruction in

both morphemic analysis and contextual analysis (MC; n = 21), and (d) students who read, discussed, and responded to a young-adult book with no explicit instruction in vocabulary strategies (IC; n = 21). During the interventions, which consisted of nine 50-minute lessons of instruction and three of review lessons over 4 weeks, the researchers rotated among the four classes to control for teacher instructional effects. Additionally, three graduate students and three regular classroom teachers observed the implementation of the interventions for instructional consistency across the four experimenters.

The research design mixed both quantitative and qualitative methods. The quantitative data were collected in the form of pretest and posttest scores. The pretests consisted of a standardized, multiple-choice vocabulary test and an experimenter-constructed multiple-choice test that assessed the students' preexperimental knowledge of the target and transfer words employed in the study to ensure the equivalency of the groups and serve as covariates in the data analysis. The posttests included five measures of word-meaning assessed immediately following the interventions and two that were administered 5 weeks subsequent to the interventions. Both pretests and posttests exhibited strong internal consistency, as evidenced by a range of coefficient alphas between 0.75 and 0.93.

After the completion of the treatments and the subsequent posttests, Baumann et al. (2002) collected qualitative data in the form of individual interviews with 12 participants, three from each group who represented low, average, and high scores on the pretest. During the interviews, students were asked to read and analyze words for their morphemic features or the contextual clues that aid in comprehension. The questions

about the words were followed with open-ended questions that asked about the strategies the students employed while answering the previous questions.

One of the purposes of the pretests was to ensure the equivalency of the groups before the interventions began and to serve as a covariate for analysis of posttests. The results of the ANOVA run to determine group equivalency indicated that they did not differ. Baumann et al. (2002) checked that all assumptions for the statistical tests were met. The results of the analyses of the measurements indicated that students who received instruction in morphemic analysis and contextual analysis, separately or together, statistically significantly outperformed the students in the control group both immediately and after a delay of 5 weeks. Baumann et al. found a strong immediate transfer effect of morphemic analysis instruction and a less robust transfer effect of contextual analysis instruction, neither of which persisted after the treatment. No evidence was found that morphemic-analysis or contextual-analysis skills increase reading comprehension skills. Additionally, no statistically significant difference was found between the groups that received either morphemic analysis or contextual analysis instruction separately versus combined.

According to Baumann et al. (2002), the results support the literature that states that explicit teaching of words increases students' vocabulary skills. It also demonstrated that students can be taught morphological elements and analysis procedures. They also found, however, that participants' skills acquired in morphemic- and contextual-analysis degrade with time, thus supporting the consistency and continuation of such programs. The study did not support the influence of morphemic and contextual analysis skills on comprehension skills, which is an area that Baumann et al. identified as one for future

research. They also acknowledged limitations of their study, such as the limited prefixes used for morphemic analysis, the use of instructors who were not a part of the regular school program, and the use of an intervention that is supplementary, rather than a part of, the regular school program. An additional limitation the researchers acknowledged was the short duration of the intervention.

Due to the evidence from their previous study of the effectiveness of combining morphological and contextual analysis for increasing students' vocabulary skills, Bauman et al. (2003) conducted another study in response to the lack of experiential evidence that increasing students' vocabulary skills increases their reading vocabulary. Particularly, they sought to create an effective vocabulary intervention that would not require a large amount of classroom time and compare its effectiveness to the vocabulary development program that is part of a fifth-grade social science textbook. The participants were 157 fifth-grade students in eight classes in four different schools and their teachers, who had agreed to participate in the study and implement the interventions. Although intact classes were the unit of study, the classes were heterogeneous in make-up in regards to academic ability and assigned randomly to either the treatment group or the control group.

The treatment in the study by Baumann et al. (2003) consisted of 15 minutes of daily instruction within the 45-minute social science block of class for 33 days. The treatment group received instruction in analyzing morphological or contextual clues to determine an unknown word's meaning. For morphological clues, participants were instructed to look for root words, prefixes, and suffixes for the purpose of building meaning. For contextual clues, participants were instructed to look for definitions

provided by the author, synonyms or antonyms in the text, examples, or general meaning clues provided in the text around the unknown word. The control group that received the vocabulary instruction from the social-science textbook compared and contrasted word meanings, predicted and verified word meanings, used semantic maps and word definitions, created examples and non-examples of word definitions, and assessed partial knowledge of word meanings.

Baumann et al. (2003) evaluated the participants' growth in vocabulary over the course of the intervention by comparing their scores on seven posttests to two pretests. The pretests included a norm-referenced measurement of vocabulary and a multiple-choice test of content knowledge regarding the civil war, the unit of study during the intervention. The posttests included a test of vocabulary from the textbook, the same vocabulary test taken as a pretest, an immediate and delayed assessment of vocabulary in context, chapter tests from the textbook, and a reading comprehension assessment with passages not previously read. The teachers were asked to complete a questionnaire regarding their perceptions of the program, and both students and teachers were interviewed. The results indicated that the participants who had received the morphological and contextual analysis training were more able to infer the meanings of novel, affixed words than the control group ($\eta^2 = 0.423$, which the researchers report as a large effect). Additionally, the teachers reported that their students were generalizing their word-analysis skills to contexts beyond their social science classroom. There was no difference between the groups on the measures of comprehension. A limitation of the study is that few morphological features were explicitly taught: 15 prefixes, 5 suffixes, and no roots.

Two experimental studies have investigated the effect of a spelling program that teaches morphological features of words to students beyond elementary school. In 1981, Robinson and Heese conducted an investigative study of the spelling program *Corrective Spelling Through Morphographs* (Dixon, 1979) with a sample of 143 seventh-grade students in an experimental group that received the program and 29 seventh-grade students in a control group that received spelling instruction as a part of vocabulary instruction. A morphograph is a written morpheme. The participants were measured on a test of spelling-rule application, a test of morphographic analysis and the spelling subtest of the *Stanford Achievement Test* were administered as pretests and as posttests after 140 lessons of 20 to 35 minutes. The results indicated that the treatment group participants spelled significantly more words correctly on the tests of spelling-rule application and morphographic analysis ($p < 0.01$) than the control group (with an effect size of 0.40), but there was no difference between the groups on the *Stanford Achievement Test.*

As a result of the mixed results and the low effect size obtained in the previous study, Heese et al. (1983) conducted another study on the *Corrective Spelling Through Morphographs* (Dixon, 1979) with 109 students in the seventh grade. The purpose of the study was to extend knowledge about increasing students' spelling skills through increasing their awareness of morphemes as well as to explore retention of learned spelling. All of the participants in the study received the spelling training; there was not a control or comparison group. The participants were assessed before, immediately after, and one year after the completion of the program using the *Stanford Achievement Test* and a researcher-created test of morphograph spelling. The participants gained 1.3

standard deviations in morphographic skill between pre- and posttests, but less than one standard deviation on the *Stanford Achievement Test.* One year later, however, it was found that the morphographic spelling posttest had accounted for 11% of the variance in the follow-up morphographic spelling test and 2% of the variance in the *Stanford Achievement Test, $p < 0.001$.* Hence a small amount of transfer was observed from the spelling program to general skills of spelling.

Conclusion

Although there is evidence of the effects of increasing students' orthographic skills and morphological awareness on their reading fluency and comprehension, no studies were found that investigated the combined effect. One set of studies was found (Shankweiler et al., 1996) which first demonstrated the relationship between morphological awareness, spelling, and decoding skills and then found relationships between decoding skills, spelling skills, and reading comprehension. When investigating the basic reading and spelling skills of 68 high-school students, Shankweiler et al. found correlations between morphological awareness and spelling skills ranging from 0.52 to 0.85 and between morphological awareness and decoding 0.47 for real words and 0.55 for non-words ($p < 0.01$). Spelling skills were also related to decoding abilities (0.68 for real words; 0.70 for non-words, $p < 0.01$).

In the second part of their study, Shankweiler et al. (1996) assessed a separate sample of 86 freshmen from high, medium, and low ability groups from the same public high-school as in the first study for the purpose of investigating the relationship between the students' decoding and spelling skills and their reading comprehension. Measurements included standardized measurement of reading comprehension, tests of

non-word decoding, regular- and irregular-word spelling, vocabulary, and the magazine recognition test (Stanovich & West, 1989) to measure print exposure. Results indicated that decoding and spelling skills were significantly related to one another (0.60 for regular words, 0.51 for irregular words, and 0.65 for non-words), as well as to reading comprehension at the 0.01 level. The correlation between decoding skills and reading comprehension was 0.45, and the correlations between spelling and reading comprehension ranged from 0.49 for irregularly spelled words to 0.57 for non-words and 0.58 for regularly spelled words. Consequently, the results of the studies by Shankweiler et al. (1996) indicated that there is a relationship between morphological awareness and spelling skills and reading comprehension for high-school freshmen.

The findings of Shankweiler et al. (1996) and the literature reviewed support claims of a relationship between knowledge of orthographic conventions and morphologic features of words and students' reading fluency and comprehension skills. At the elementary- and middle-school levels, increasing students knowledge of orthographic conventions and morphological features has been found to increase reading fluency and comprehension for students with and without diagnosed learning disabilities and of different reading levels. Knowledge of orthographic conventions and morphologic features facilitates the analysis of words students cannot immediately identify for the purpose of accessing meaning. The more familiar readers are with orthographic conventions and morphologic features, the more words they can access through their familiarity with word-parts.

The current study is in response to the lack of empirical evidence on the effects of spelling instruction on reading skills on high-school students, despite evidence that high-

school students lack spelling skills and reading fluency, and the fact that morphological knowledge is increasingly necessary for understanding texts as students progress in grades. The study builds upon the current literature in the influences of both orthographic knowledge and morphological awareness on reading skills of students with and without diagnosed learning disabilities, and of differing reading proficiency levels.

CHAPTER III
METHODOLOGY

The goal of the current study was to examine the effect of a spelling intervention consisting of instruction in and practice with orthographic conventions and morphological features of words on the reading fluency and comprehension skills of high-school freshmen in contrast to in-class Independent Reading (IR) of equivalent duration over the course of one full semester. Additionally, the data was to be analyzed to determine if there are differential effects for students with and without a diagnosed learning disability as defined by whether or not they have an Individualized Education Plan (IEP) and for students of differing English proficiency levels as demonstrated by their scores on the California STAR test, which were obtained through school records. The participants' scores on a spelling assessment were utilized as a covariate.

Research Questions

1. Does instruction in orthographic conventions and morphological features of the English language increase the reading fluency of high-school freshmen more than giving them in-class time to read independently?
2. Does instruction in orthographic conventions and morphological features of the English language increase the reading comprehension skills of high-school freshmen more than giving them in-class time to read independently?
3. Does instruction in orthographic conventions and morphological features of English have more of an effect on the reading fluency and comprehension skills of high-school freshmen who have been identified as having a learning disability as determined by their special education status than those who have not?

4. Does instruction in orthographic conventions and morphological features have more of an effect on the reading fluency and comprehension skills of high-school freshmen who are below proficiency level in English Language Arts than those who are at or above proficiency as measured by their CST scores?

Research Design

This quasi-experimental study examined the effect of spelling instruction focusing on orthographic conventions and morphological features (the independent variable) on the reading fluency and comprehension skills (the dependent variables) of high-school freshmen in a large, full-inclusion, urban high school in Northern California over one semester (18 weeks). The independent variable in the study, or the treatment, has two levels: the experimental group received instruction in orthographic conventions and morphological features of words and the control group received 20 minutes of in-class time to read. The participants were 92 freshmen high-school students in 8 English classes of either 19 or 20 students that were assigned randomly to either the experimental group or the control group, with four classes in the experimental group and four in the control. Spelling knowledge of the participants was measured prior to the study in order to act as a covariate. Pretests in reading fluency and comprehension skills were given to all participants. At two points during the semester (after every 11 lessons), the reading comprehension test was administered in order to evaluate and compare the effects of the different phases of the treatment. At the completion of the treatment, the measurements of reading fluency and comprehension skills were re-administered. The passages used for the timed oral reading were the same for pre- and post tests, due to the amount of time which will have passed between administrations (17 weeks). The reading comprehension

test (NDRT) has two forms (G and H), which were used alternatively with each administration.

The first four classes of the beginning of the 2007-2008 school year were allotted for pretesting due to the length of time required for the reading fluency assessments and to avoid using excessive class-time. The treatment took place during 20-minute sessions in each English class over the following 15 weeks (classes meet every-other day for 95 minutes each), with the exception of 2 sessions (after each 11 class sessions) which were used for follow-up administrations of the reading comprehension assessment and four classes during which neither the intervention nor the control situation were implemented due to a shortened school-day. Additionally, two class periods were not utilized (one at the beginning at the semester and one in November) at the request of the participating teachers. There was a resultant total of 33 class sessions divided into three, 11-lesson phases. The remaining four classes of the first semester (not including the week of finals) were utilized to administer the posttests. The intervention was researcher-designed and was implemented by the researcher.

Participants and Setting

The 92 participants in the current study were members of eight classes made up of 19 or 20 high-school freshmen in a large, urban high school in a large city in northern California. The total enrollment of the school is approximately 1,700 students. Current available information regarding the ethnic diversity of the entire school was collected by the California Department of Education during the 2005-06 school year and is as follows: 55% of the students are reported as White, not Hispanic, 18% as Hispanic or Latino, 14.9% as Asian, 3.3% African American, not Hispanic, 1% Filipino, less than 1%

American Indian or Alaska Native or Pacific Islander and 6.9% Multiple or No Response (Ed-Data, 2007). The state does not disaggregate the category "Multiple or No Response" (CDE, 2006b).

A total of 11 students moved or changed classes during the course of the study, resulting in 149 who completed the activities. Only 92 of those 149, 49 in the experimental group and 43 from the control classes, returned parental permission forms to be included in the analyses. Since they were freshmen at the time of the study, the participants had entered high-school for the first time and had not yet completed any high-school credits. The ages, gender, and ethnicity of all of the students were collected from school records at the beginning of the school year. The students' ages ranged from 13 to 16 years old, with the majority of students aged 14 (109 versus 39 15-year olds); only one student was 13 and one was 16, though neither were included in the analyses because they had not returned permission forms. The majority of the students were male, with slightly more in the control classes (38 or 54%) than in the experimental classes (38 or 51%). Information regarding the ethnicity of the classes is included in Table 1.

Table 1

Ethnicity of Classes from which Participants were Drawn

	Control Classes (N = 71)		Experimental Classes (N = 74)	
Ethnic Category	Number	Percent	Number	Percent
White	42	59.18	38	51.36
Hispanic	13	18.32	17	22.98
Black	4	5.63	2	2.70
Korean	2	2.81	1	1.35
Chinese	2	2.81	1	1.35
Vietnamese	1	1.40	4	5.40
Filipino	1	1.40	0	0
Other Asian	6	8.45	9	12.16
Other/not specified	0	0	2	2.70
Total	71	100	74	100

The participants of the study were drawn from the 2007-2008 freshman class that included English Language Learners with a minimum Limited English Proficiency level of five (which is considered Fluent English Proficient and qualifies students to exit English Language Development programs) and students with Individualized Education Plans (IEPs), due to a full-inclusion program at the school where the study took place. There were three students with IEPs in each group, and no identified English Language Learners. The English Language Arts (ELA) proficiency levels of the students in the sample, as determined by their CST scores, are provided in Table 2. Proficiency levels range from one to five, where one is far below basic, two is below basic, three is basic, four is proficient and five is advanced. For some of the students, ELA proficiency levels were unavailable in the school records; those students are labeled below as *NA*. Proficiency levels are included in the present study because not all students with reading deficiencies receive special education services, due to the subjective nature of the process of referring students for services. All 6 students in the study who had IEPs were males. The ELA proficiency score was only available for one of the students with IEPs in the control group (ELA 1) and the 3 students in the experimental group who had IEPs had ELA scores of 2, 4, and NA.

Table 2

ELA Proficiency Levels of Classes by Group

	ELA Proficiency Level					
Group & Criteria	5	4	3	2	1	NA
Control Classes N	16	25	10	4	0	16
Percent	23	35	14	6	0	23
Experimental Classes N	20	18	15	3	2	16
Percent	27	24	20	4	3	22

Eight freshman English classes made up the population for the study. At the high school where the study took place, there are currently 20 freshman English classes taught by eight different teachers. Due to block scheduling, most teachers have freshmen every other day. For practical purposes, four teachers who teach their freshman classes on the same day were chosen randomly from the eight who had expressed willingness to participate in the study. As pre-tests were being conducted, however, one teacher withdrew from the study. Each of the three remaining teachers taught three classes, which were assigned randomly to the experimental treatment group or the control group, as presented in Table 3. Teacher C's third class was excluded from the study because it meets on a different day from the other two. The maximum number of students per freshman class in the district where the study took place is 20 students; two classes consisted of only 19. The resultant population consisted of 160 students in eight different classes, taught by three different teachers, equally divided between the experimental group and control group as outlined in Table 3.

Table 3

Division of Classes by Teacher

Instructor	Control Classes	Experimental Classes
Teacher A (3 classes)	19 students	40 students
Teacher B (3 classes)	40 students	20 students
Teacher C (2 classes)	21 students	20 students
Total (8 classes)	80 students	80 students

There were seven students in the control group and six in the experimental group who either left the school, changed classes, or were added to one of the participating classes after the study began, leaving 71 students in the control group and 74 in the experimental group. The nine students from the control group who did not complete the

entire study were equally divided among the three teachers. From the experimental group, all but one of six students who either left the school or class or added the class after the study had begun were with Teacher A; only one student from Teacher B left after the study began, and none left from Teacher C's class.

Human Subjects Considerations

The participants in this study were protected in compliance with the standards set by the American Psychological Association (2001). Permission was obtained from the University of San Francisco Institutional Review Board, as well as from the principal of the participating high school. Both students and parents were provided with consent forms to sign that included information about the study and contact information in the event that they had questions or concerns. Copies of the consent forms are included in Appendix A. In order to obtain signed consent from parents, parents were contacted three different times: via letters sent in the mail, reminder letters to parents who had not yet returned forms, and stickers given to students who had returned permission forms. In addition, participating teachers provided reminders to students who had not turned in permission slips.

Participation in the study was voluntary and participants were able withdraw their data from the study at any time. Withdrawal from the study meant that students would continue to receive instruction and assessments, which were used by the teachers to inform instruction, but results were not included in analyses. All data collected were kept in a locked cabinet in the researcher's care or returned to the teachers. All individual participants' results were kept confidential and released only to their teachers for instructional purposes. All of the participants signed the student-consent forms. A total

of 92 participants returned parent-consent forms, 43 from the control group (59% of the students in the classes) and 49 from the experimental group (66% of the students in the classes). Among those for whom permission was not obtained were the 13 year-old participant and the 16 year-old, leaving a group that consisted of 14 and 15 year-old students.

Instruments

Spelling knowledge was measured at the outset of the study in order to be used as a covariate. All participants were administered the *Spelling Feature Assessment* (Bear, Invernizzi, Templeton, & Johnston, 2004), which was designed as a diagnostic tool to help teachers appropriately design instruction that supports students in their spelling skills in the areas of within-word patterns, syllables and affixes, and derivational relations. The test is made up of 40 words and takes approximately ten minutes to administer. The resultant score is on a scale of 0 to 115, which is a combination of 40 possible words spelled correctly and a possible 75 feature points, based upon orthographic and morphologic features of the words.

The Nelson-Denny Reading Test (NDRT) was used to measure reading comprehension. The test has been used as a measurement of reading comprehension by the freshman English teachers in the school where the study took place. There are two equivalent forms (G and H) of the assessment, which were used alternately with each administration. The test is made up of two subtests, one which measures vocabulary knowledge and one which measures reading comprehension. Only the reading comprehension subtest, which is made up of seven reading passages and 38 multiple-choice questions, was administered. The reading comprehension subtest has a time limit

of 20 minutes. The test's reliability ranges from 0.88 to 0.95 (Brown, Fishco, & Hanna, 1993) and has been used to predict college success (Chambers, Munday, Sienty, & Justice, 1999).

Three passages from the released test questions from the California STAR test for 9th grade were utilized to measure the participants' reading fluency**.** The passages were randomly chosen from the possible reading passages of 250 words or more, as per the recommendation of Rasinski (2004) for measuring reading accuracy and rate. Released test questions were chosen because of their direct link to the California State Standards for English Language Arts (CDE, 2007), and hence the grade-level reading texts. The purpose for multiple passages is to achieve as accurate a measure as possible of the participants' reading rates, taking into consideration possible differences among the passages. The passages are publicly available on the California Department of Education web site (CDE, 2007). The researcher timed the participants as they read each passage and kept a record of the number of words the participants read correctly in one minute on each different passage. In order to account for varying difficulties of words, the average of the three passages was recorded for analysis.

The materials and the sequence of lessons for the spelling interventions were developed by the researcher based upon the Slingerland approach (Slingerland, 1994) and *Words Their Way: Word study for phonics, vocabulary, and spelling instruction* (3rd ed.) (Bear, Invernizzi, Templeton, & Johnston, 2004). Materials for each lesson consisted of word-sort cards with the day's concept and journals for each participant for keeping a record of orthographic rules, exceptions, and examples, and morphological features and their meanings. Words for the sort cards were drawn from lists of words that follow

spelling patterns in *Speech to Print* (Moats, 2000), *Teachers' Word Lists for Reference* (Slingerland & Murray, 1987), *Unlocking Literacy: Effective Decoding and Spelling Instruction* (Henry, 2003), and *Words Their Way: Word study for phonics, vocabulary, and spelling instruction* (3rd ed.) (Bear, Invernizzi, Templeton, & Johnston, 2004).

Piloting of Intervention Materials

Although the researcher had utilized the activities in the lesson plans in her teaching of high-school students with learning disabilities, the lesson formats were piloted to ensure feasibility and interest level for the participants. At least one lesson from each of the three phases of instruction was conducted with the researcher's class of freshmen in a special education English support class, a resource English summer-school class, and at least a general English summer-school class.

As a result of the pilot administrations, word sorts were adjusted to clarify categories and eliminate redundancies. The 20-minute duration of the lesson was deemed appropriate and the participants appeared to enjoy the lessons. Additional feedback was received from the participants regarding the nature of the words used, and some words were removed because of double meanings previously unknown to the researcher.

Procedures

Every class session of the fall semester was utilized for either assessment or intervention sessions with the exception of two classes mid-semester. These two classes are short in duration due to a reduced school-day and hence were not utilized out of respect for the class-time of the participating teachers. As a result, 43 class sessions were available for the study, divided between assessment sessions and treatment sessions as explained in Table 4.

Table 4

Time-line of Treatment

Class Sessions	Activities
Sessions 1-4	*Assessments:* Spelling Assessment – *Spelling Feature Assessment* Fluency Assessment – Oral reading passages from STAR Reading Comprehension Assessment – Nelson Denny
Sessions 5-14	*Phase 1* – Orthographic Conventions: Six Syllable Types
Session 15	*Assessment:* Reading Comprehension Assessment – Nelson Denny
Sessions 16-27	*Phase 2* – Orthographic Conventions with introduction of Morphologic Features – Spelling Rules for Adding Affixes
Session 28 (Nov. 20)	*Assessment:* Reading Comprehension Assessment – Nelson Denny
Sessions 29-39	*Phase 3* – Morphologic Features – Greek & Latin Roots
Sessions 40-43	*Assessments:* Fluency Assessment – Oral reading passages from STAR Reading Comprehension Assessment – Nelson Denny

The researcher administered the pretests to the participants during the first four classes of the fall semester of the 2007-2008 school year. The test of spelling knowledge and the assessment of reading comprehension (NRDT) were administered to whole classes in one sitting. The researcher conducted all of the spelling tests in one day; the reading comprehension tests were conducted on a separate day. For the fluency assessment, the researcher removed participants from class to test individually in a separate room. Each participant was given three passages to read while the researcher timed the participant's reading and made notes of errors. The researcher stopped each participant after one minute on each passage. In order to calculate a score of words correct per minute (WCPM), the number of errors on each passage was subtracted from

the number of words read, according to the process of calculating WCPM as described by Hasbrouck and Tindal (2006) and Rasinski (2004), who reports a concurrent validity of .91 between WCPM and reading comprehension. All assessments were hand-scored by the researcher or scored via a scantron machine. Data were recorded using participant numbers rather than names to reduce the possibility of researcher bias.

The intervention was conducted during 20 minutes of each class session in three 11-class blocks subsequent to the pretests. At the end of each block, the reading comprehension subtest of the NDRT was re-administered (in October, November, and January). At the same time of class as the spelling lessons, the control group received 20 minutes of independent reading (IR), during which the participants read independently while the teacher read silently as a model. Twenty minutes is the time period provided for classroom IR by the majority of the English teachers at the participating school. The IR is a modification of the Accelerated Reader Program (Groce & Groce, 2005) in which students choose books from a list and complete quizzes on the computer when finished reading. In the school where the study took place, students are required to read and complete quizzes for a set number of books per grading period, which students read during classroom IR and at home. The teachers who participated in this study were asked to strictly adhere to a 20-minute duration for classroom IR with the control groups to ensure equivalency with the amount of time provided for the spelling treatment. They also were asked to modify the independent reading assignment for participants who did not have in-class time to read as a result of the spelling intervention. Both groups were expected by their teachers to read books outside of class at their independent reading

level, as determined by a computerized assessment, and take assessments with a computer program upon each book's conclusion.

The experimental group received 20 minutes of instruction in and practice with orthographic conventions and morphological features. Other studies of the effects of spelling instruction on reading skills utilized a treatment of 20-minute duration. For example, Berninger, Vaughan, Abbott, Brooks, Begay, Curtin, Byrd, and Graham (2000) utilized 24 20-minute sessions divided by an assessment with second graders. Graham, Harris, and Fink Chorzempa (2002) utilized an intervention of 20-minute duration over 48 sessions with second graders. Uhry and Shepherd (1993) utilized a 20-minute duration once a week over 28 weeks with first grade participants. Although the participants of the current study were more mature than those in the studies cited, the content was adjusted accordingly to ensure that the time-frame was utilized appropriately.

Similar to the study by Graham, Harris, and Chorzempa (2002), the current study incorporated word study techniques that included word sorting and word building activities. Word sorting is an activity that takes students between 3 and 5 minutes to complete, depending on the difficulty of the sort and the level of the students (Bear, Invernizzi, Templeton, & Johnston, 2004). Word building is an extension activity in which students build new words using the patterns they have learned (Graham et. al, 2002).

In addition to word sorting and building, participants in the study kept word journals recording the patterns taught and reviewed in the lessons. There were three phases of the intervention, each designed to last 11 lessons. The outline for each of the three phases is included in Appendix B. The first phase focused mainly on orthographic

conventions in the form of the six main syllable types and within-word spelling rules. The second phase combined orthographic conventions and morphological features by introducing prefixes and suffixes and the orthographic conventions that govern the addition of suffixes to words. The third phase was designed to develop participants' knowledge of morphological features, particularly Latin roots and Greek combining forms. During this phase, an important step was drawing participants' attention to the spelling changes that roots, prefixes, and suffixes undergo when combined. Throughout each lesson, the researcher reviewed the concepts previously taught and drew participants' attention to the fact that Latin words are very regimented in the way that they can be combined, whereas the Greek forms are more flexible.

The first two phases of the intervention included two types of lessons: presentation and review. Details of the lesson plans are included in Appendix C. The presentation lessons were primarily visual in modality and were intended for the presentation of concepts. The presentation lessons consisted of four parts: a word-sort to draw participants' attention to orthographic conventions or morphological features of study, a notation of the identified rule, an expansion time for participants to brainstorm further examples, and a time to share. During the word-sort, the researcher distributed pre-made cards with words that followed the day's pattern or rule and informed the participants the number of categories in the sort. Paired participants then sorted the words into categories, which they justified to the researcher as the class jointly discovered the rule, under the guidance of the researcher. The rule was written on the overhead or board by the researcher and in journals by the participants. Expansion took place in pairs and consisted of time for the participants to come up with their own words

that followed the pattern with the researcher facilitating. The classes then came back together as a whole group for sharing their words and determining whether or not they fit the day's pattern or rule.

The review lesson plan was used to review concepts at key points during the orthographic convention phases. The review plan consisted of a word sort to remind participants of the patterns taught, presentation of a spelling strategy, guided practice, and paired practice, in which paired students quizzed each other with words from that day and the day before. Each segment of both plans took approximately 5 minutes and were carefully monitored.

During the first phase (syllable types), review lessons occurred after the first two and every three subsequent presentation lessons to act as a continuous review. During the second phase (spelling rules), review lessons occurred after presentation lessons in which spelling rules were presented. The third phase (Greek and Latin roots) consisted of all presentation lessons.

Data Analysis

The data collected from the assessments were first organized so that descriptive results could be reviewed. Secondly, correlations were calculated between the dependent variables (reading fluency and reading comprehension) and the covariate (spelling skill). The two independent variables of this study are treatment, which has two levels, spelling and IR, and time, which has four levels, before intervention and after 12, 24 and 36 sessions. The effects of the independent variables on the dependent variables were assessed using analysis of covariance (ANCOVA) and *t* tests. Results were interpreted in terms of effects, practicality, and ease of use for practitioners.

CHAPTER IV
RESULTS

This chapter is organized into five sections. In this section, the intent of the study is summarized and the research design and hypotheses are restated. In the second section, results from the analyses of the spelling assessments are presented for the purpose of establishing the equivalency of the two groups and to explain how and why spelling ability was used as a covariate. The third section presents the results of the data analyses as they pertain to the four research hypotheses. The fourth section presents the results of ancillary analyses. A fifth section summarizes the results.

This study utilized a quasi-experimental design in order to examine the effect of spelling instruction that focused on orthographic conventions and morphological features on the reading fluency and comprehension skills of high-school freshmen. The purpose was to compare spelling instruction to in-class independent reading (IR), with the goal of increasing the participants' reading fluency and reading comprehension. The students who participated in the study were assessed for their reading fluency, reading comprehension, and spelling skills before and after the intervention, and the reading comprehension assessment was repeated twice within the study (after each 11 class sessions).

The dependent variables were reading fluency and reading comprehension skills. The independent variables were time and the intervention, which had two levels, spelling instruction and in-class independent reading. The intervention took place with eight intact English classes that were assigned randomly to either a group that received instruction in orthographic conventions and morphological conventions (the experimental group) or a group that received the equivalent amount of time to read during class (the

control group). If it was found that spelling instruction did in fact increase the participants' reading fluency or reading comprehension skills more than IR, the data were to be further analyzed for differential effects for students with learning disabilities or those who are below proficiency in English Language Arts, as measured by the CST. The hypotheses that drove the study were as follows:

1. Instruction in orthographic conventions and morphological features of the English language will increase the reading fluency of high-school freshmen significantly more than giving them independent time to read.
2. Instruction in orthographic conventions and morphological features of the English language will increase the reading comprehension skills of high-school freshmen significantly more than giving them independent time to read.
3. Instruction in orthographic conventions and morphological features of English will have more of an effect on the reading fluency and comprehension skills of high-school freshmen who have been identified as having a learning disability as determined by their special education status than those who have not.
4. Instruction in orthographic conventions and morphological features will have more of an effect on the reading fluency and comprehension skills of high-school freshmen who are below proficiency level in English Language Arts than those who are at or above proficiency as measured by their CST scores.

Spelling as a Covariate

The spelling ability of the participants was measured at the beginning of the study in order to ensure equivalency of the experimental and control group and in order to act as a covariate if necessary. The means and standard deviations for the experimental

group and the control group on both the pretest and the posttest of spelling ability are presented in Table 5.

Table 5

Means and Standard Deviations for Spelling Assessments

	Spelling Pretest			Spelling Posttest		
Group	N	Mean	SD	N	Mean	SD
Experimental	46	96.93	16.17	43	101.4	14.77
Control	43	95.93	17.24	42	100.4	15.87

The means of the scores of both assessments were higher, and the standard deviations lower, for the experimental group than the control group. An analysis of variance (ANOVA) revealed that the two groups did not statistically significantly differ, however, on either the pretest, $F(1, 87) = .08$, $p = .78$, or the posttest, $F(1, 83) = .09$, $p = .77$. Subsequently, it can be concluded that the groups were equivalent at the beginning and at the end of the study in regards to spelling ability.

The correlations among the spelling measurements (SP) and the oral reading fluency (RF) and the reading comprehension (RC) scores were obtained and are presented in Table 6. All of the correlations are significant at the .01 level.

Table 6

Correlations between Spelling (SP), Reading Fluency (RF), and Reading Comprehension (RC) Assessments across Time

	SP 1	SP 2	RF 1	RF 2	RC 1	RC 2	RC 3	RC 4
SP 1		.88	.56	.53	.47	.42	.47	.28
SP 2			.64	.59	.56	.54	.58	.34
RF 1				.59	.55	.50	.59	.42
RF 2					.44	.43	.46	.45
RC 1						.88	.81	.52
RC 2							.78	.50
RC 3								.54

As had been expected, the highest correlations were between two tests of the same type. For example, the correlation between the pre- and posttest spelling assessments was .88, the pre- and posttest reading fluency assessments .59, and the correlations among the first three reading comprehension assessments were .78 or higher. The correlations between all of the tests and the last reading comprehension assessment are lower than with the other three assessments (the highest correlation is .54), which is likely the result of unusually low raw scores for one individual class or the effect of the school's winter break that occurred between the third and fourth administrations.

The correlations between the spelling posttest and the other measures were higher than those with the spelling pretest, with the highest correlation between the spelling posttest and the first assessment of reading fluency (.64). In contrast, the correlations between the reading fluency pretest and the other measures was higher than those with the reading fluency posttest, with the highest correlations between the reading fluency pretest and the reading fluency posttest (.59) as well as the third administration of the reading comprehension assessment (.59).

Due to the fact that the correlations among the measures were all statistically significant, spelling was used as a covariate to control for differences in spelling ability between the groups when addressing the first two research questions that asked if instruction in orthographic conventions and morphological features of the English language will increase the reading fluency and reading comprehension skills of high school-freshmen. Spelling was not used as a covariate for the third research question because there were too few participants with learning disabilities for statistical analyses

and for the fourth because there were not comparisons made between the experimental and the control groups.

Assumptions

Due to the fact that analyses of the data were conducted using analysis of covariance and *t*-tests, several assumptions needed to be met in order for the results to be valid. The first assumption is that there be a limited number of covariates; the current study employed only one covariate, spelling ability, thus meeting the assumption. The measurement of spelling ability was continuous and interval, with little error. Spelling ability was found to be linearly related to the dependent variables, reading fluency and reading comprehension, as demonstrated by the correlations provided in Table 6. All observations were independent of one another; participants in the control group were in different classes at different times from those in the experimental group and all testing was monitored carefully by the researcher and the participating teachers. The spelling assessments were hand-scored by the researcher to reduce the amount of error.

Normality was assessed for all variables by way of an inspection of histograms and boxplots. The histograms portrayed approximate normal distribution for each variable except the measurement of reading comprehension for the control group, which exhibited a slight positive skew. Levene's test of equality of error variances was used to evaluate whether the variance and covariances of the dependent variables were similar between the experimental and control groups. Neither result was significant, providing evidence that the assumption of homogeneity of covariance had not been violated. The linearity of spelling was checked against the pre- and posttest measures of both reading fluency and reading comprehension. All of the scatters were linear in nature.

Homogeneity of regression of the dependent variables (reading fluency and reading comprehension) was equal for each group. Lastly, the sample size was adequate for the statistical tests; there were over 40 in each group.

Results by Hypothesis

Reading Fluency

The first hypothesis for this study was that instruction in orthographic conventions and morphological features would increase the participants' reading fluency more than in-class, independent reading. In order to ensure equivalency of the groups before the treatment began, the participants' reading fluency was measured at the beginning of the study. The assessment was re-administered at the completion of the study to determine which group's scores increased to a greater degree. The means and standard deviations for both the pretest and posttest of oral reading fluency are presented in Table 7. All means reported are adjusted means, taking the covariate into consideration.

Table 7

Means and Standard Deviations for Reading Fluency (RF) Assessments

	RF Pretest			RF Posttest		
Group	N	Mean	SD	N	Mean	SD
Experimental	48	143.52	39.73	49	155.65	44.24
Control	43	147.23	28.42	41	154.37	35.44

An ANOVA was conducted to determine that spelling was a statistically significant covariate for both the pretest, $F(1, 88) = 39.98$, $p = .000$, and the posttest, $F(1, 87) = 57.17$, $p = .000$, measures of reading fluency. The experimental group's mean score on the pretest of reading fluency was lower than that of the control group but higher at the posttest. The difference between the two groups was not statistically significant for

either the pretest, $F(1, 88) = .85$, $p = .01$, nor the posttest score, $F(1, 87) = 78.79$, $p = .08$, as determined by analysis of covariance (ANCOVA). As a consequence, the two groups were statistically equivalent at the beginning and at the end of the study.

Reading Comprehension

The second hypothesis was that instruction in orthographic conventions and morphological features would increase the participants' reading comprehension skills more than in-class, independent reading. The reading comprehension skills of the participants were measured before the intervention began and after every 11 class sessions. The means and standard deviations for all of the reading comprehension assessments are provided in Table 8. All means reported are adjusted to take the covariate into consideration.

Table 8

Means and Standard Deviations for Reading Comprehension Assessments

	RC Pretest			RC 2			RC 3			RC Posttest		
Group	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Exp	49	18.82	6.75	47	18.28	7.81	44	22.23	7.42	47	20.40	8.11
Control	43	18.21	8.18	42	18.57	8.66	38	21.92	7.81	43	14.12	8.97

An ANOVA revealed that spelling was a statistically significant covariate for both the pretest, $F(1, 89) = 28.24$, $p = .000$, and the posttest, $F(1, 87) = 7.56$, $p = .007$, measures of reading comprehension. The experimental group's scores were lowest at the second administration and highest at the third; the control group's scores were highest at the third administration and lowest at the last. The ANCOVA revealed that at the beginning of the study there was no statistically significant difference between the mean scores for experimental group and the control group on the reading comprehension assessment, $F(1, 89) = .16$, $p = .90$, indicating the equivalency of the two groups.

Additionally, for the second and third administration of the test, there continued to be no significant difference between the groups, $F(1, 86) = .03$, $p = .87$ and $F(1, 79) = .03$, $p = .85$, respectively.

There was a statistically significant difference found between the two groups on the final reading comprehension score, $F(1, 87) = 12.28$, $p = .001$. The experimental group's mean score was statistically significantly higher than that of the control group. Both groups' mean scores steadily increased with each assessment until the last. On the final assessment, the mean scores of both groups dropped slightly, but more so for the control group than the experimental group (a difference of 7.8 points from the third administration to the fourth for the control group and 1.6 for the experimental group). The drop in scores by both groups may be a result of the two-week break in the school year between the third reading comprehension assessment and the fourth due to the Christmas holiday.

Students with Learning Disabilities

The third hypothesis for this study was that instruction in orthographic conventions and morphological features of English would have more of an effect on the reading fluency and comprehension skills of high-school freshmen who had been identified as having a learning disability as determined by whether they have an individualized education plan (IEP) than those who have not. Analyses were not conducted to confirm or deny the hypothesis because only 3 participants with learning disabilities completed the study and returned parent-permission forms, despite the fact that the classes that participated in the study included eight students with learning disabilities, evenly divided between the experimental and control groups.

From the experimental group, two students from Teacher A's classes were not included: one student with a learning disability was expelled from the school, and one did not return the parent-permission form. The two participants in the experimental group who had learning disabilities and whose data were included in the analyses were both in Teacher B's classes. From the control group, one student with a learning disability from Teacher C's class left the school after the study began, and two students were added to their classes after the pretests had been administered (one each in Teacher C and Teacher A's classes), leaving only one student with a learning disability with Teacher C whose results were included in the data analyses. The subsequent numbers of two participants in the experimental group and one in the control group is too small to analyze based on quantitative methods.

The three participants with learning disabilities who completed the study and returned parental permission forms were a heterogeneous group, who exhibited wide ranges of abilities in reading and spelling. Their reading fluency (RF) ranged from 71 to 127 words correctly read per minute and their reading comprehension (RC) scores ranged from 2 to 14. The scores on the assessments are provided in Table 9, in which each participant with a learning disability is represented as PwLD. Also included is the participants' California State Test (CST) score in English Language Arts when available. A score of 2 is considered below basic.

Table 9

Assessment Results for Participants with Learning Disabilities

	Group	CST	SP 1	SP 2	RF 1	RF 2	RC 1	RC 2	RC 3	RC 4
PwLD1	Exp	2	59	57	74	71	7	4	5	2
PwLD2	Exp	NA	79	82	91	116	13	13	NA	7
PwLD3	C	NA	66	73	119	127	6	12	NA	14

The participant who scored lowest on the reading fluency assessment scored the lowest on the other measures as well and grew the least between assessments (his scores actually decreased with each assessment). Of the other two, one scored lower but grew more on in the area of reading fluency and the other scored lower but grew more on the spelling assessments. The participant who had the higher reading fluency scores on both the pretest and posttest was the only one of the three participants whose reading comprehension scores increased with each assessment. His final reading comprehension scores were also higher than the others: his was 14 and the others scored 7 and 2. More information about the participants and their learning disabilities would be necessary to draw conclusions about the differences among the participants' differing growth patterns.

Proficiency in English Language Arts

The final hypothesis of the study was that instruction in orthographic conventions and morphological features would have more of an effect on the reading fluency and comprehension skills of high-school freshmen who are below proficiency level in English Language Arts (ELA) than those who are at or above proficiency as measured by their California State Testing (CST) scores. The CST scores of 1 (far below basic), 2 (below basic), and 3 (basic) are considered to be below proficiency level, 4 is considered proficient, and 5 is considered to be advanced. In the experimental group, there were 11 participants whose CST scores were below proficiency level, and 27 of the participants scored at or above the proficiency level. For the remaining participants, CST scores were unavailable via school records.

In order to determine if the instruction had more of an effect for students who were below proficiency level than those who were at or above, the pre- and posttest scores on the measures of both the dependent variables, reading fluency and reading comprehension, were compared for the participants in the experimental group. Due to the fact that only two groups were compared, both of whom were in the same treatment group, a *t*-test was conducted and spelling ability was not used as a covariate. Presented in table 10 are the means, standard deviations, and *t*-test results for the at or above proficiency level group and the group of participants who scored below proficiency on the CST.

Table 10

Means, Standard Deviations and t-Test Results by Group and Variable

Group	Variable	N	Mean	SD	*t*
≥ Proficiency					
	Reading Fluency Pretest	27	158.78	33.52	3.44*
	Reading Fluency Posttest	27	175.63	33.49	
≥ Proficiency					
	Reading Comprehension Pretest	27	21.50	7.18	2.36**
	Reading Comprehension Posttest	27	23.88	7.33	
< Proficiency					
	Reading Fluency Pretest	11	106.70	41.70	1.59
	Reading Fluency Posttest	11	124.50	29.90	
< Proficiency					
	Reading Comprehension Pretest	11	14.09	4.85	0.53
	Reading Comprehension Posttest	11	14.64	7.15	

* significant at the .001 level; ** significant at the .01 level

Although the mean of the group that was below proficiency level in English Language Arts grew more than that of the group that was at or above proficiency level (17.8 points versus 16.85) from the pretest to the posttest of reading fluency, the growth was statistically significant for the group that was at or above proficiency, not for the below-proficiency group. In regards to reading comprehension, the group that was at or

above proficiency level grew considerably more than the below-proficiency group (2.38 points versus .55) between the first and the last administrations. As with the results of the reading fluency assessments, the only statistically significant difference between pre- and posttest scores was for the group that was at or above proficiency in English Language Arts.

Additional analyses were conducted to determine whether there was a statistically significant difference in the amount the two groups grew in their reading fluency or reading comprehension skills as a result of the instruction in orthographic conventions and morphological features. The means and standard deviations for their growth rates on both the reading fluency assessments and the reading comprehension assessments are presented below in Table 11.

Table 11

Means and Standard Deviations for Experimental Participants' Growth in Reading Fluency and Reading Comprehension by ELA Proficiency Group

	RF Growth			RC Growth		
Group	N	Mean	SD	N	Mean	SD
> = Proficiency	27	16.85	25.46	26	2.38	5.15
< Proficiency	11	17.73	37.06	11	.55	3.39

Although the participants who had CST scores below proficiency in ELA appeared to grow more in reading fluency from the pretest to the posttest than those who were at or above proficiency, the difference in growth was not statistically significant, $t(36) = 0.08$, $p = .93$. There was also no statistically significant difference in growth between the groups' pretest and posttest scores in reading comprehension, $t(35) = 1.08$, $p = .29$, despite the fact that the group whose CST scores were proficient or higher appeared to grow more than those who were below proficiency.

Ancillary Analyses

In addition to the information gathered from the results as they pertain to the research hypotheses, data were also analyzed to explore whether the activities in the lessons used in the study were enjoyable for the students and whether reading fluency levels are an area of concern for the sample of students who participated in the study. Included in this section are results of informal, post-hoc reflections on the reactions of the participants to the spelling instruction and a descriptive analysis of the participants' reading fluency levels.

Participants' Reactions

Reflection upon the intervention revealed mixed reactions on the part of the participants; while the majority of the participants seemed to enjoy the activities, some were more resistant and reluctant to participate. One factor that may have contributed to the variety of their feelings was that the treatment occurred at different times during class. In Teacher A's classes, the intervention occurred during the last 20 minutes of class and the experimental groups were both before lunch. The majority of her students seemed to enjoy the intervention, with some even expressing joy to see the researcher when she entered the room. Many of the participants volunteered to distribute materials, most were actively engaged, and there were even those who competed with the others during the brainstorming sessions. Often the students were so engaged that it was difficult to gain their attention to direct them to other activities within the lesson. For the most part, participants worked with the same partner for paired activities throughout the study. Only one student in the second class was resistant to participating and exhibited signs of impatience for lunch. This particular student expressed that he thought the

interventions boring, but he did not take advantage of opportunities to make the activities more difficult (challenges to come up with more difficult words that fit the pattern). Mid-way through the study, the researcher began to stamp the students' papers with a colorful, holiday-themed stamp, which was an incentive for them, including the resistant student, to participate in the brainstorming activity.

In Teacher B's classes, the intervention was the first activity and the experimental group was the first class of the day. As a consequence, the spelling lesson was the activity with which they began their school day. All of her students were cooperative and seemed to enjoy the activities. Although the students did not volunteer to distribute materials, they all worked hard, were engaged, and responded quickly when directed to change activities within the lesson. A couple of the students challenged themselves to think of words that were harder than the others', and none of the students complained or tried to evade the activities. Other than class sessions in which members were absent, participants worked with the same partners throughout the study. Two of the three participants with learning disabilities were in Teacher B's experimental group, and the researcher observed pride in them when they were able to contribute positively to the lesson and the brainstorming sessions.

Like Teacher A's classes, Teacher C's classes received the intervention during the last 20 minutes of class. Her experimental group was at the end of the day. Like Teacher A's second class that was anxious to leave for lunch, many of Teacher C's students were anxious to leave school. Teacher C's disciplinary style was also much more relaxed than the other two teachers', and as a consequence it was a challenge to engage her students who would prefer to socialize. Teacher C and the researcher changed partners with

whom participants were paired twice, and once the researcher began to use a colorful stamp as an incentive for students to create lists of words the students all participated eagerly.

Participants' Reading Fluency Levels

A second analysis that was conducted was to examine the mode, mean and range of the reading fluency scores of the participants in comparison to the national norms for students in the first through eighth grades as developed by Hasbrouck and Tindal (2006). No national norms are available for students beyond the eighth grade. Although Hasbrouck and Tindal do not provide a formula for converting the amount of words correctly per minute (WCPM) to a percentile score, they advocate using the chart of scores and percentiles they provide as a "thermometer" (p. 640) to identify students who need additional assistance. The raw scores and percentiles provided by Hasbrouck and Tindal for eighth-grade students in the spring of the school year are provided in Table 12.

Table 12

Raw Scores and Percentiles for Reading Fluency of 8th Grade Students

Percentile Spring 8th grade	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
WCPM	97	124	151	177	199

Table adapted from Hasbrouck & Tindal (2006), p. 639

In order to compare the fluency rates of the current sample as a whole to the national norms, the range, mean, median and mode of the pretest and posttest scores on the measure of reading fluency were calculated and are presented in Table 13.

Table 13

Range, Mean and Mode of Reading Fluency Pretest and Posttest Scores for Whole Group

Test	N	Low	High	Mean	Mode
Pretest	91	74	218	134.54	140
Posttest	89	71	254	156.81	138

The lowest score on both the pretest and the posttest of reading fluency fell below the 10th percentile for students at the end of 8th grade (Hasbrouck & Tindal, 2006). The mean and mode of the scores on the pretest both fell between the 25th and 50th percentiles. The mode of the current sample for the posttest was also between the 25th and 50th percentiles, but the mean of the posttest was between the 50th and 75th percentiles. On the posttest, 9 participants (10%) scored above the 90th percentile, an increase from the 4 (4%) who scored above the 90th percentile on the pretest.

In the sample of 89 ninth-grade students who took the reading fluency assessment at the beginning of the school year for the current study, only 18 (20%) scored below the 25th percentile for students at the end of 8th grade. By the end of their first semester (mid-way through the school year), a total of 17 students out of 87 (19%) scored below the 25th percentile for students at the end of 8th grade (the two students who took the pretest but not the posttest had initial scores of 158 and 174). The lowest score on both the pretest and posttest was that of a student with learning disabilities who had a CST score of 2 (below basic). The participant who had a CST score of 1 (far below basic) scored 74 on the pretest and 83 on the posttest. The majority (67 out of 87, or 77%) of the students who took both the pre- and posttest measurements of reading fluency increased their numbers of words correctly read per minute.

Conclusion

The results of this study indicate that instruction in orthographic conventions and morphological features increases the reading comprehension skills of high-school freshmen more than giving them independent time to read (IR) during class. There is no indication that such instruction is more beneficial than IR in terms of increasing students' reading fluency, nor their spelling skills. The instruction does not seem to more strongly benefit students who are below proficiency level in English Language Arts, as measured by the California State Tests, more than those who are proficient or advanced. For two of the three participants with learning disabilities, the instruction in orthographic conventions and morphological features seemed to contribute to their reading fluency and reading comprehension growth.

The instruction in orthographic conventions and morphological features seemed to be an enjoyable way for many students to learn about words and how they are put together. It was also found that, between the beginning and the end of the study, the reading fluency levels of majority of the participants increased from below to above the 50^{th} percentile for eight-grade students.

CHAPTER V
DISCUSSION

Summary of the Study

Literacy is the basis for the majority of a student's education; without sufficient reading and writing skills, students are not able to learn beyond an experiential level. Educators and law-makers alike have acknowledged the importance of literacy skills, as is evident in laws like NCLB that require all students to be proficient in both English and math by the year 2014 (Paige, 2002) and state standards requiring skills beyond the basic levels. English teachers, particularly at the high-school level, often struggle with the need to teach all of the content standards, as well as the skills of reading and writing.

The purpose of the current, quasi-experimental study, therefore, was to investigate the efficacy of an intervention for increasing the reading fluency and reading comprehension skills of high school freshmen. As a result of the high correlations between reading and spelling skills and the evidence that spelling skills increase the reading skills of elementary and middle-school students, spelling was chosen as a skill to develop with the intent of measuring its effect upon the students' reading fluency and reading comprehension skills, as compared to giving the students in-class time to read independently. Spelling skills were defined as knowledge of and ability to use orthographic conventions and morphological features of words. The participants were members of eight freshmen English classes, randomly assigned to a control group that received in-class time for independent reading or an experimental group that received the spelling intervention. The duration of the study was an entire semester, or 41 class sessions over 18 weeks. Spelling, reading fluency, and reading comprehension skills

were assessed before and after instruction, and reading comprehension was re-assessed twice between.

The results of the statistical analyses indicate that instruction in orthographic conventions and morphological features of the English language increases the reading comprehension skills of high-school freshmen more than giving them in-class time for independent reading. There was no indication that either the instruction or independent reading was more beneficial for increasing the reading fluency levels of high-school freshmen. There were statistically significant differences between pretest and posttest scores for the students who were at or above proficiency in English Language Arts as measured by their California State Test (CST) scores on both the reading fluency and reading comprehension measures. Although the students who were below proficiency level grew from the pretests to the posttests, it was not to a statistically significant degree.

Additionally, it was found that instruction in orthographic conventions and morphological features that incorporates students working in pairs sorting words into categories, contributing to the recognition and notation of the pattern that the words follow, brainstorming words of their own, and sharing their words with the class seems to be an enjoyable way for high-school freshmen to study words and increase their reading comprehension skills. Although the instruction in spelling skills did not statistically significantly increase the students' reading fluency skills more than providing them with in-class time for independent reading, the mean number of words read correctly in a minute increased for both groups, and the majority of the sample of participants read over 151 words per minute by the end of the study, which is the 50th percentile for 8th grade students at the end of the school year (Hasbrouck & Tindal, 2006). Consequently,

although the spelling treatment was not found to increase reading fluency more than giving students in-class time to read independently, it did not have less of an impact; the two treatments seemed equally efficacious.

Implications

The results of this study build upon the research that indicates strong relationships among spelling skills, reading fluency, and reading comprehension (Ehri, 1989; Katzir, et al., 2006; Shankweiler et al., 1996) and may provide researchers and teachers alike with theoretical, practical and methodological implications.

Theoretical

Theoretical implications of the current study include support for the research literature that indicates that spelling and reading skills are highly correlated and for the researcher-proposed model of the process of comprehending text, indicating that increasing spelling skills increases reading skills in high-school freshmen.

In the research literature, correlations between spelling and reading skills have ranged from .68 to .86 (Ehri, 2000). In the current study, the correlations between the spelling assessments and the reading fluency assessments ranged from .53 to .64 and the correlations between the spelling assessments and the reading comprehension assessments ranged from .28 to .59. Although not as high as those reported by Ehri, the correlations in the current study were all statistically significant at the .01 level. The indication inherent in the different numbers is that spelling more highly correlates with reading fluency than reading comprehension. This may indicate that recognizing how a word is spelled influences oral reading of the word more than knowledge of the word's meaning.

The research literature proposes several models of comprehending text that were reviewed and built upon by the present study. The model that was proposed by the researcher incorporates the review of the literature with models by Shaywitz (2003), Adams (1990), and Baron and Trieman (1980) and suggests that words that are not immediately identified by readers are read through a process of word analysis, which incorporates the reader's decoding skills, knowledge of orthographic conventions, and morphological awareness. Due to the fact that there was a statistically significant difference in the posttest scores of reading comprehension, with the experimental group outperforming the control group, the current study supports the claim that increasing students' knowledge of words, how they are spelled and composed, will increase their reading comprehension. The results of the current study supports the contention that word analysis procedures lead to reading comprehension, but not necessarily to reading fluency. This may be due to the fact that word analysis is a careful procedure, requiring the reader to focus carefully on the words being read, rather than quickly identifying them. It is possible that the growing familiarity with words resulting from word analysis may eventually lead to increased reading fluency, with practice.

Practical

Although knowledge of the relationships between spelling and reading are of importance to reading theory, it is also important to teachers in the field who are concerned with increasing their students' English skills on a daily basis. The results of the current study indicate that a small intervention of 20 minutes per class period can significantly increase students' reading comprehension skills more than giving them in-class time to read independently. The activities seem to benefit students who are at or

above proficiency level in English Language Arts more than students who are below proficiency level. This may be the result of the higher levels of engagement on the part of students with higher proficiency levels or their stronger knowledge base before approaching the activities. Both groups increased their skills, however, indicating that, if increasing reading comprehension skills is the goal, and class-time is limited, it may be more beneficial to begin the school year with word study activities focusing on orthographic conventions and morphological features than independent reading time.

Although the heterogeneous nature of the groups that participated in this study contributed to the high standard deviations on the measures employed, heterogeneous groups can be advantageous in a public high-school class setting. Teachers have more flexibility to group students in a variety of ways and for a variety of purposes if there is a wide range of abilities in their classes. Students are given opportunities to learn from one another and participate in a variety of learning groups. Learning about the composition and range of abilities of several English classes can inform teachers' practice.

Although correlations were not calculated between the participants' CST scores and their reading fluency and reading comprehension skills, reading fluency and reading comprehension skills were found to increase as the CST scores of the participants increased. The implication is that the CST may be in fact, despite skepticism on the part of public high-school teachers, a good measure of the ELA proficiency level of high-school freshmen.

A positive implication for high-school English teachers is the reading fluency abilities of the current sample. Unlike over 60% of the 303 ninth-grade students whose fluency rates Rasinski and Padak (2005) measured at the end of the school year in 2005

and who scored below the 25th percentile for 8th graders, the majority of the students in the current study read over the 50th percentile for 8th grade students. The implication is that either there are significant differences between the reading abilities of high-school freshmen in Ohio and California or high-school freshmen read more fluently today than they did in 2005. This implication is important for teachers because of the high correlations reported in the research literature between reading fluency and reading comprehension (Katzir, Kim, Wolf, O'Brian, Kennedy, Lovett, & Morris, 2006; Rasinski & Paddak, 2005), which are both important literacy skills (NRP; NICHD, 2000).

Methodological

There were several implications for research with high-school students that can be inferred from the results of the current study. Information was learned about the research materials themselves, about obtaining permission from parents of high-school students, and about creating a culture of research within a school community to one of support and encouragement rather than just permission.

The materials that were employed in the current study as intervention activities were designed by the researcher and based on activities from *Words Their Way* (Bear, Invernizzi, Templeton, & Johnston, 2004) and the Slingerland (1994) approach to teaching reading and writing to children with dyslexia. The participants began the lesson by sorting sets of words into categories. Then the whole group, under the guidance of the researcher, discovered the rule that governed the categories. Once the participants had recorded the rule in their journals, they worked with a partner to create a list of their own words that followed the rule. After 5 minutes, the participants shared their lists, discussing any words that did were inappropriate. Because the results indicated that such

an intervention increases reading comprehension skills and the majority of the participants enjoyed the activities, the implication is that such activities are useful and appropriate for high-school freshmen.

The current study contributed to the knowledge base about some of the challenges and rewards inherent in conducting research in which high-school students are the participants. The parents of the participants were very cooperative, and only two parents denied permission. Often, however, students asked the researcher for multiple copies of the permission form to replace those that had been lost. As a consequence, it appears that the difficulty with conducting research at the high-school level is not the willingness of the parent but the organization and logistics of the transfer of permission forms between the researcher and the parents.

A second obstacle inherent in research conducted in public schools is the cooperation of the administration and the teachers themselves. Although permission was obtained from the participating school and teachers volunteered to allow the study to be conducted in their English classes, more cooperation with the school administration would have encouraged more parents to return permission forms and more teachers to participate. If the school climate were such that research were encouraged, permission forms for the study could have been included with the registration forms that were sent to the families of incoming freshmen. Encouragement to participate in the study could have come from the administration rather than just the researcher and the participating teachers themselves. The implication is that although the participating school currently allows research to be conducted within the school day and is appreciative of the additional

information gathered as a result, the climate is not yet one that values research enough to facilitate and encourage it.

Limitations

There were several factors that limit the interpretations and the generalizability of the results of this study. The study was not conducted with random sampling and random assignments, but was conducted with eight intact high-school freshman English classes over the duration of the fall semester. Inherent as the result of conducting a study in a public high school, limitations included factors regarding the sample of participants and elements that affected the methods of conducting the study.

Sample

Several factors that were the result of conducting research in a public high school affected the size and composition of the sample of participants. Those factors included changing schedules, attrition, and the difficulty of obtaining parental permission. The study began with the first day of school. At that point, problems with students' schedules were still being resolved, and students were moved in and out of classes during the first week. As a consequence, some students who were administered the pretests were changed out of their English class before subsequent posttests were administered, and others were added after the pretests. Additionally, throughout the semester-long intervention, participants were lost to attrition due to students moving, changing schools, or dropping out of high school.

It was also difficult to obtain sufficient numbers of permission forms from the students. Although eight freshman English classes of approximately 20 students each participated in the activities that constituted the research study, only 98 students (61%)

returned the permission forms necessary to include their data in the analyses. The subsequent group of participants consisted of too few students with learning disabilities to statistically analyze their results and small numbers of participants in the experimental group whose CST scores were below proficiency level (11, or 22%). As a consequence, there were limitations placed upon the statistical procedures that could be employed and the conclusions gathered.

Methodology

Factors that constrained the methods by which this study was conducted include a lack of random selection of participants and true random assignments to treatment groups, the heterogeneousness of the participating classes, the lack of control by the researcher over classroom instruction outside of the interventions, lack of control by the researcher over the administration of the reading comprehension assessments, the different disciplinary styles of the participating teachers, and the lack of consistency in the amount of time that passed between reading comprehension assessments as the result of school vacations.

A truly experimental study, in which students are randomly selected and assigned to groups, was not possible in the current setting. Although students at the participating school are randomly assigned to their English teachers, the researcher was not able to ensure the randomization of the process. Additionally, class changes that were made after the school year began were often the result of parental or administrative decisions. The study was confined to utilizing intact classes, and the school schedule constrained the numbers of teachers who were able to participate in the study. The school district in

which the study took place utilizes block scheduling, in which students take three classes each day, which meet every other day.

One result of utilizing intact classes is the lack of control over the composition of the groups. The English classes that participated in the study were extremely heterogeneous in regards to their English Language Arts abilities as measured by the CST and in regards to their reading fluency levels and reading comprehension skills, as was evident in the high standard deviations on all measures. Although heterogeneous grouping is advantageous for classroom instruction, it is sometimes difficult to obtain sufficient numbers for the different sub-groups for running statistical analyses.

Due to the fact that the interventions occurred during 20 minutes of each 95-minute class period, a second limitation was the lack of control over other classroom instruction. Although all three participating teachers had been provided with the format of the intervention and asked to limit the amount of time that the control group read during class to ensure an equivalent amount of time as the experimental group's treatment, there was no way guarantee of compliance. In addition, there was no guarantee that the experimental group would not receive in-class time to read. In fact, the researcher noticed some classes instructed to read independently after she left the room or while they waited for her to arrive. What went on in the classes when the researcher was not present was beyond her control.

In addition to classroom instruction outside of the intervention, there was also a lack of control over the administration of the reading comprehension assessments. All of the teachers who participated in the study had experience giving the Nelson Denny Reading Comprehension Test, and so were asked to administer the pretests and posttest

while the researcher was administering the reading fluency assessments. Although the teachers are all experienced with the test, there is no guarantee that every administration followed standardized procedures.

A last methodological factor regarding the teachers who participated in the study is the different disciplinary styles of the participating teachers. All three teachers varied in their expectations for their students' behavior. One teacher was very strict, never allowing students to talk without raising their hands, one teacher was very relaxed and rarely asked students to raise their hands, and the third teacher allowed for some talking out and required some hand-raising. This affected the amount of effort it took on the researcher's part to maintain order or the flow of the lessons and encourage participation.

A last factor that limited the results of this study, and thereby their interpretation, was the lack of consistency in the amount of time that passed between reading comprehension assessments as the result of school vacations. Between the pretests and the second administration of the reading comprehension assessment, there were no days of school vacation. Between the second and third administrations, school was out for only one day. Between the third administration of the reading comprehension assessment and the posttest, however, were two weeks and three days of vacation. These breaks in the school calendar affected the consistency with which the students received the treatment interventions.

Recommendations

Recommendations can be made from the results and the implications of the current study for both researchers and classroom teachers.

Research

Future experimental research is warranted to better determine the effect that instruction in orthographic conventions and morphological features has upon the reading fluency and reading comprehension skills of high-school freshmen. Among the recommendations are utilizing a larger and more varied sample, including more participants with learning disabilities, more participants with varied English Language Arts (ELA) proficiency levels, and further exploring the links between word identification and vocabulary knowledge.

Although the current sample employed was large enough to conduct statistical analyses, a larger sample would allow for more accurate generalizations to the larger population of high-school freshmen. Additionally, the sample included only high-school freshmen in a large, urban high school in northern California. As a consequence, the generalizability of the results to students in other areas is questionable.

The literature base would also benefit from studies that include more students with disabilities as participants. Students with disabilities, particularly in the area of reading and writing skills, are particularly at risk for weaknesses in reading fluency and reading comprehension. As a consequence, interventions that benefit students with learning disabilities are in demand and need to be researched further.

In addition, a sample of participants that includes more students of different ELA proficiency levels would provide a broader view of the effects of the intervention. The current study did not find any statistically significant difference between the effects of the intervention on participants who are below and those who are at or above proficiency level. The number of participants in each group was small, however; of the 48 students

who received the spelling treatment, 11 had scores below proficiency level and 27 were at or above (there were no scores available for 9 of the students). Of interest for future research would be differences in intervention effects among the different proficiency levels, which would require larger group numbers than were possible in the current study.

A last suggestion for future research would be to continue to search for empirical support for the model of comprehending text proposed in the current study. Beyond continuing to study the link between word analysis procedures and reading fluency, it would be useful to study the link between word identification and vocabulary knowledge explicitly, and to research whether word study techniques contribute to reading comprehension independent of vocabulary knowledge.

Classroom

From the results and implications of the study, several recommendations can be made for English teachers to incorporate in their daily, classroom instruction. Among the classroom recommendations are suggestions for including word-analysis activities in daily, classroom activities, and expanding the activities beyond the English classroom.

One result that is pertinent to classroom teachers is that throughout the study both the group that received spelling instruction in orthographic conventions and morphological features as well as the participants who received in-class time to read independently increased their spelling skills as well as their reading fluency and reading comprehension. The group that received the spelling instruction, however, statistically outperformed the group which read independently on the posttest measure of reading comprehension. Consequently, it is recommended that English teachers of high-school

freshmen include daily spelling activities that focus on orthographic conventions and morphological features in order to increase their student's literacy skills.

An additional recommendation for classroom teachers is to expand the word study activities that made up the lessons in the spelling intervention. Word-connection activities could be assigned for homework and daily lessons could include student-generated patterns and word forms. Connections could be made across curricular domains, particularly in the sciences in which many of the vocabulary words students need to learn are of Greek or Latin origin. Lastly, teachers could incorporate mini-lessons on morphology in all of their lessons on vocabulary, highlighting the relationships among words and how adding derivational suffixes affects spelling and meaning.

Summary

The purpose of the present study was to examine the effects of spelling instruction in orthographic conventions and morphological features on the reading fluency and comprehension skills of high-school freshmen. Additional research questions included whether there was a differential effect of the spelling instruction on students who had learning disabilities or those who were below proficiency in English Language Arts. Prior to this research, the only empirical research done on the spelling and reading skills of high-school freshmen had been correlational (Nagy, Diakidoy, & Anderson, 1993; Rasinski, & Padak, 2005; Shankweiler, Lundquist, Dreyer, & Dickinson, 1996).

A quasi-experimental methodology was used with a sample of 92 high-school freshmen in eight English classes at a large, urban high school in northern California. The participants' classes were randomly assigned to either an experimental group that

received 20-minute spelling lessons focusing on orthographic conventions and morphological features of words or a control group that was given an equivalent amount of in-class time to read independently. Assessments in spelling and reading fluency were conducted as pre- and posttests, and reading comprehension was assessed before, after, and at two points during the study. Data were analyzed using parametric methods (ANOVA, correlation, and *t*-tests). The results indicated that there was a statistically significance between the two groups on the posttest measure of reading comprehension with the experimental group outperforming the control group, $F(1, 87) = 12.28$, $p = .001$. A statistically significant difference was not found between the groups on the posttest measures of reading fluency, $F(1, 87) = 78.79$, $p = .08$.

The study had also intended to investigate differential effects for students with learning disabilities and those whose English abilities were below proficiency level as measured by the California State Tests. The data from the participants with learning disabilities were not analyzed due to the small number of participants with learning disabilities who were members of the participating classes throughout the study and who returned permission forms. For the participants whose English abilities were below proficiency level, no effects were found that differed from students at or above proficiency.

The results of analyses indicated that the majority of the students who received the spelling intervention enjoyed the activities. The participants' enjoyment of the independent reading time was not considered because it is a practice that has been in place at the participating school for many years. Additionally, the reading fluency levels

of the group of participants as a whole was analyzed to compare the sample to students measured by other researchers.

The results have implications in regards to the theoretical knowledge on the connection between spelling and reading, as well as for researchers and classroom teachers alike. High correlations found between spelling and reading skills supported previous research, and the experimental results supported the researcher-developed model of reading comprehension. Implications for research with public high schools included the willingness of parents to cooperate and the logistical difficulties of obtaining their permission. Most importantly, the results of the study are helpful for classroom teachers because the intervention was found to be an enjoyable, efficient way to increase the reading comprehension skills of high-school freshmen.

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APPENDIX A
CONSENT FORMS

Parent Consent Form For Study On The Effect Of Instruction In Orthographic Conventions And Morphological Features On The Reading Fluency And Comprehension Skills Of High-School Freshmen

Ms. Alicia Roberts, a graduate student in the College of Education at the University of San Francisco and a special education teacher at Westmont, is doing a study on the effects of spelling instruction on the reading fluency and comprehension skills of high-school freshmen. She is interested in whether teaching spelling strategies increases reading skills to a greater extent than in-class, independent reading time (IR).

The students in your son or daughter's English class are being asked to participate in this research study because they are freshmen at Westmont High School and their teacher has agreed to dedicate 20 minutes of class time to either IR or the spelling treatment. As a part of the study, students will receive pretests in reading comprehension and spelling as a part of their regular instruction. Additionally, they will receive short (20 minute) follow-up assessments every 6 weeks to chart their growth in reading comprehension. The research study will take place throughout the fall 2007 semester. During the second semester, the teachers will continue with IR or spelling strategy instruction if they so choose.

For the purposes of comparing possible differential effects of the instruction, as well as describing the participants, demographic data will be collected through school records on students' ages, gender, special education status and ELA STAR test results. Study records will be kept strictly confidential. No individual identities will be used in any reports or publications resulting from the study. Study information will be coded and kept in locked files at all times. Only Ms. Roberts and your son or daughter's teacher will have access to the assessment results, and then only for instructional, not evaluative purposes.

The anticipated benefits for your son or daughter are increased reading skills. Additionally, an anticipated benefit of the research study is a better understanding of the benefits of spelling instruction for reading comprehension. There will be no cost to you as a result of taking part in this study, nor will you be reimbursed for your participation in this study.

If you have questions about the research, you may contact Ms. Roberts at 408-378-1500 extension 6214 or e-mail her at aroberts@cuhsd.org. If you have further questions about the study, you may contact the IRBPHS at the University of San Francisco, which is concerned with protection of volunteers in research projects. You may reach the IRBPHS office by calling (415) 422-6091 and leave a voicemail message, by e-mailing IRBPHS@usfca.edu, or by writing to the IRBPHS, Department of Counseling Psychology, Education Building, University of San Francisco, 2130 Fulton Street, San Francisco, CA 94117-1080.

PARTICIPATION IN RESEARCH IS VOLUNTARY. You are free to decline permission for your son or daughter to be in this study, or to withdraw him or her from it at any point. Westmont High School and Campbell Union High School District are aware of this study but do not require that your son or daughter participate in this research. If you decline permission, your son or daughter will continue to receive instruction and participate in the assessments that are a normal part of classroom procedures, but the resultant data will not be included in the subsequent analyses.

Consent

I have been given a copy of the "Research Subject's Bill of Rights," and I have been given a copy of this consent form to keep. PARTICIPATION IN RESEARCH IS VOLUNTARY. I am free to decline to have my child be in this study, or to withdraw my child from it at any point. My decision as to whether or not to have my child participate in this study will have no influence on my child's present or future grade in his or her English class.

My signature below indicates that I agree to allow my child _____ to participate in this study.

_____ _____

Signature of Subject's Parent/Guardian Date of Signature

_____ _____

Signature of Person Obtaining Consent Date of Signature

Thank you for your cooperation.

Sincerely,

Alicia Roberts, M.A.

Student Consent Form For Study On The Effect Of Instruction In Orthographic Conventions And Morphological Features On The Reading Fluency And Comprehension Skills Of High-School Freshmen

Ms. Roberts, a teacher at Westmont High School, is also a graduate student in the College of Education at the University of San Francisco. As part of her studies, she is doing research on the effects of spelling instruction on the reading skills of high-school freshmen. She is interested in whether teaching spelling strategies increases reading skills to a greater extent than in-class, independent reading time.

The students in your English class are being asked to participate in Ms. Roberts's research study because you are freshmen at Westmont High School and your teacher has agreed to dedicate 20 minutes of class time to either independent reading or a spelling activity. As a part of the study, you will receive pretests in reading and spelling as a part. Additionally, you will receive short (20 minute) assessments every 6 weeks to chart your reading growth. The research study will take place throughout the fall 2007 semester. During the second semester, the teachers will continue with independent reading or spelling strategy instruction if they so choose.

The results of your assessments and any other data Ms. Roberts collects will be kept confidential. Study information will be kept in locked files at all times. Ms. Roberts will not share any information, including your assessment results with anyone except your teacher, who will use it to help determine your learning needs, and you or your parents upon request.

Your parents have received an information sheet that you can refer to for more information. Additionally, feel free to discuss the research study with Ms. Roberts at any time. She can be found in Room 32 during tutorial.

Thank you for your cooperation.

Sincerely,

Ms. Roberts

APPENDIX B
SEQUENCE OF LESSONS

Phase 1: Six Syllable types

- Closed syllables (short vowel sounds) and first syllable division rule

  1. *Presentation* – when there are 2 consonants between vowels, divide between them

- Open syllables (long vowel sounds) and second division rule

  2. *Presentation* – a vowel at the end of a syllable is long (says its name); when there is only one consonant between two vowels, the most common division is after the first vowel

  3. *Review* – dividing words into syllables & identifying vowel sounds/spellings using closed and open syllable types

- Silent *e* syllables (long vowel sounds) with both single and multi-syllabic words

  4. *Presentation* – silent *e* after a single consonant makes the preceding vowel long

- Vowel-*r* syllables

  5. *Presentation – r* following a vowel changes the pronunciation of the vowel

- Final Stable syllables

  6. *Presentation* – an unaccented syllable containing a consonant plus *l* and silent *e;* never single-syllable words; can occur with any of the other syllable types

  7. *Review* – closed, open, silent *e,* vowel-*r,* vowel team and final stable syllable types, thinking of patterns before spelling

- Vowel team syllables

  8. *Presentation* -- two vowels working together

- Soft *c* and *g*

  9. *Presentation* – when *c* and *g* are followed by the letters e, i, or y, the sound is soft

- Single-syllable word endings (that apply after a short vowel sound)

  10. *Presentation – Floss Rule;* digraphs & trigraphs

11. *Review* – all six syllable types, soft c & g, and single-syllable word endings

Phase 2: Spelling Rules for adding affixes

- Suffixes – difference between inflectional & derivational

1. *Presentation* – identifying suffixes

- Doubling rule

2. *Presentation* – when a one syllable word ends in one consonant after one vowel, double the final consonant to add a suffix that begins with a vowel

3. *Presentation* – when a 2-syllable word ends in a single consonant after a single vowel & the accent is on the second syllable, double the final consonant to add a vowel suffix

4. *Review* – practice with single and multisyllabic words

- Dropping rule

5. *Presentation* – when a word ends in a silent e, drop the e when adding a vowel suffix, except when a silent e follows a c or g, keep the e to add a non-e, i or y suffix (to keep consonant sound)

6. *Review* – practice with silent *e* syllables and final stable syllables

- *Y*-Rule

7. *Presentation* – when a base word ends in *y,* change the *y* to *i* before adding any suffix, unless the *y* is preceded by a vowel or the suffix begins with an *i.*

8. *Review* – practice with words that end in *y*

- Plurals

9. *Presentation* – add *es* to words ending in the following: *s, x, z, ch, sh;* add *es* to words ending in an *o* after a consonant; change the *f* to a *v* in words ending in *f* or *fe*

10. *Review* – practice and review all 3 spelling rules and plurals

- Prefixes

11. *Presentation* – identifying prefixes

Phase 3: Roots and Extended Prefixes and Suffixes – all presentation lessons; all lessons combine roots with as many prefixes and suffixes as possible

1. Morphemes – difference between free & bound
2. Latin Roots: *form, port, rupt, tract*
3. Latin Roots: *scrib, spec, struct, dict*
4. Latin Roots: *flect, mit, fer, cred*
5. Latin Roots: *duc, puls, vers, pend*
6. Latin Roots: *fact, ject, tens, curs*
7. Greek Combining Forms: *phono, photo, graph, auto*
8. Greek Combining Forms: *tele, logy, micro, meter*
9. Greek Combining Forms: *therm, bio, biblio, cracy*
10. Greek Combining Forms: *geo, scope, polis, derm*
11. Greek Combining Forms: *dem, hypo, cycl, phys*

APPENDIX C
LESSON PLANS

Presentation

Word Sorting: In pairs, students sort cards with words that fit pattern into categories

1. Lay & Say – Students in pairs lay out the words in their pack, saying them as they do so
2. Guided sort – Instructor tells students how many categories are in the sort; students sort the word cards

(5 minutes)

Rule/Pattern Identification: Instructor and students identify orthographic or morphemic patterns with examples and non-examples. Instructor writes on board/overhead, students write in Word-Study Journals.
(5 minutes)

Expansion: In pairs, students brainstorm other words that fit the pattern, writing the words in their journals. Each pair tries to come up with the most examples.
(5 minutes)

Share out: The whole class then shares words to verify pattern "fit" and writes the words in their journals.
(5 minutes)

Review

Word Sorting: Review of previous day's concepts following same procedures as visual lesson
(5 minutes)

Spelling Strategy: Instructor presents, models and leads guided practice of strategy
(5 minutes)

Spelling Practice: In pairs, students dictate words from lists created the previous day to each other to write. After 5 minutes, students switch roles (dictator versus writer).
(10 minutes)