IMPROVING THE SPELLING SKILLS OF ELEMENTARY STUDENTS WITH MILD LEARNING AND BEHAVIOR PROBLEMS: A COMPARISON BETWEEN AN EXPLICT RULE-BASED METHOD AND TRADITIONAL METHOD

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VITA

Kate D. Simmons daughter of Dr. Leland Simmons and Judy Simmons was born October 18, 1975, in Auburn, Alabama. She grew up in Orlando, Florida with her older brother, Tucker Simmons. Upon graduating from The First Academy in Orlando, Florida, she elected to attend Auburn University. On March 19, 1999 she received a bachelor's degree in Human Development and Family Studies with a minor in art history. She then received her master's degree in Rehabilitation and Special Education on May 12, 2001. She was initiated into Alpha Theta Chi, The National Honor Society, and Delta Epsilon Iota Academic Honor Society. For two years, she served as an instructor for undergraduate courses within the College of Education at Auburn University. She has also worked for five years in both Auburn City and Opelika City Schools as a special education teacher. Her teaching experiences include elementary special education, middle school special education, and an alternative K-12 school. She has also garnered around $1,500 in grant monies for her students. After her first year teaching, she was awarded Alabama Power's 1st Year Teachers Initiative Award.

DISSERTATION ABSTRACT

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Students with learning and behavior problems often experience great difficulty in written expression, especially in the area of spelling. Even though students with mild disabilities often have lower achievement levels across all content areas, spelling ability has been determined to be a powerful predictor between low achieving students and students with learning disabilities. The purpose of this study was to examine the effects of two instructional procedures for teaching elementary students with mild learning and behavior problems to spell. Overall, there were three specific questions the researcher

wanted to investigate: (a) Are there specific methods that are more effective in improving the spelling performance of students with mild learning and behavior problems? (b) Are there specific methods that are more effective for students maintaining their spelling knowledge? and, (c) Do students with mild learning and behavior problems have a preference towards certain types of spelling instruction?

In the present study, 41 students from an inner city elementary school in Southeast Alabama with mild learning and behavior problems were randomly assigned to either the traditional or explicit rule-based group. Daily instructional sessions lasted 20-25 minutes for a total of three weeks. Every effort was made to ensure differences in spelling performance were due to instructional features.

Results suggest that both types of instruction were effective in teaching students to spell. Findings indicated that students had no preference for the way they were taught spelling and that they enjoyed spelling. Informal interviews revealed that students in general have difficulty using the correct spelling strategies, transferring those skills to other content areas, and may display inappropriate behavior when frustrated.

The lack of explicit rule-based performance in this particular study contradicts a large body of evidence that suggests a more systematic approach to spelling is most effective in teaching students with mild learning and behavior problems to spell. Ultimately, future research should include maintaining and transferring new spelling skills to novel situations in order for students to become autonomous in their spelling, while potentially, improving their reading and writing skills.

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Style manual or journal used Publication Manual of the American Psychological Association (5th edition)

Computer software used Microsoft Word and SPSS Version 14

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I. RELEVANT ISSUES IN SPELLING INSTRUCTION

> "*Students with learning disabilities typically have difficulties with handwriting and spelling, and such difficulties can interfere with the execution of other composing processes, constrain writing development, and mark a child as a poor writer"* (Graham, 1999, p. 78).

Spelling has been a frequent topic in educational research throughout the last decade. A large body of empirical data related to spelling instruction in regular education exists; however, little attention has been paid to investigating the effectiveness of these programs when being used in the classrooms of students with learning and behavior problems (Vaughn, Schumm, & Gordon, 1992). Spelling is a highly complex process and is often characterized as an area of difficulty for students with learning disabilities (LD) (Carpenter & Miller, 1982; Kirk & Elkins, 1975). Within the subject of spelling, there are ongoing debates about: (a) the role teachers play in teaching spelling, (b) the critical features of their teaching, and (c) the effectiveness of the instruction or technique they use. Although a large body of research exists on how to teach spelling, educators and researchers agree there is a declining trend in the area of spelling performance for students with and without disabilities across the United States.

Statement of the Problem

Current national and state assessments indicate that general and special education students have difficulties with spelling, sentence structure, and composition. The National Assessment of Educational Progress (NCES, 1998) indicates that 16% of fourth grade students, 16% of eighth grade students, and 22% of 12th grade students were not able to write at the most basic level. Additional data from the NAEP (2003) indicates that only 29% of students were ranked as proficient or advanced in their reading skills while 42% were classified as basic in reading followed by 29% labeled as below basic. Also, there were significant increases in the rate of spelling errors (number of errors per 100 words) at the fourth-, eighth- and eleventh-grade. Although these numbers are not significant enough to produce a large body of spelling literature, there may be other reasons why spelling research is not at the top of the agenda at the national and state level.

Principals and administrators are putting general and special education teachers under enormous pressure to increase performance in the classroom. Results from a multi-state survey have found that teachers are changing what and how they teach in response to state testing programs. These changes were found to be greatest in states where more consequences are attached to test results. Veteran teachers in some states said that they used test-preparation strategies more than they used to. Such strategies include teaching test-taking skills; teaching the standards or outlines known to be on the test, providing students with items similar to those on the test, test-specific preparation materials, and older tests released from their state (Olson, 2002). These pressures may lead to a decline in spelling and/or reading instruction or extinguish it altogether.

With new requirements of the No Child Left Behind Act (2001), and high-stakes accountability tests now in every state, state educators are also feeling the pressure to improve student performance. Thus, teachers are expected to introduce more content within their subject area, increase standardized test scores and maintain their paperwork. Operating under the assumption that spelling is of lesser importance within the curriculum standards (i.e., English and Mathematics), instructional time allocated to spelling instruction may be minimized.

Furthermore, the emphasis placed on reading instruction in methodology classes within universities may leave teachers with the impression that spelling instruction is less important. Some teachers assume that students will pick up better spelling techniques through their writing or in other content areas. This method however does not prove to be effective for students with learning and behavior difficulties. With this continuous pressure (to teach in only their main content area), spelling instruction may continue to fall lower and lower on the agenda of many educators.

Wertz, Gardner, Weber, and Bullara (1996) describe other contributing factors that have led to the unsatisfactory progress of spelling among general and special education students. The authors describe factors such as inadequate commercial spelling texts, a lack of individualized instruction, and the use of traditional spelling procedures over programs and techniques that have an empirical research base.

Johnston (2001) found that most of the general education teachers he observed remained dissatisfied both with what they are doing (their spelling instruction) and with their results (students continuing to spell poorly). He discussed one teacher's frustration with her improvised spelling program, and her return to using the basal speller even

though she thought other teachers viewed her teaching methods as “regressing.” When teachers realize that traditional approaches to spelling are not effective, they are often unaware of other instructional methods, sometimes leading to trial-and-error techniques at the students’ expense (Carnine, Silbert, & Kameenui, 1997).

Spelling Difficulties of Students with Mild Learning and Behavior Problems

According to MacArthur, Graham, Haynes and DeLaPaz (1996), students with learning disabilities typically misspell two to four times more words in their writing than normally achieving students. To some, this may not seem to be a significant problem, however, misspellings may cause the reader to be distracted and therefore not receive what the writer had originally intended. Even if the reader can decipher the misspelled word, it can set a tone for judging a speller as inept or careless. Furthermore, Mercer and Mercer (1998) discuss the reader’s perception of a person’s spelling ability as an indicator of his or her level of education or intelligence.

Spelling difficulties can also be detrimental to the psyche of the speller. Graham (1990) contends that difficulty in spelling may hinder a student’s fluency, proficiency, and self-confidence as a writer, thus affecting the final product. Jorm (1983) explains that students may try to disguise their inability to spell by producing poor handwriting, avoiding writing in general, or expect teachers to correct their writing.

Overall, research has shown that students with mild behavior and learning difficulties have frequent questions when spelling and have greater difficulty with writing than their normally achieving peers. Generally, students with LD have more problems producing writing that is polished, expansive and coherent than students without

disabilities (Harris & Graham, 1999). Traditional spelling instruction has failed to work for students with mild learning and behavior problems. Researchers have suggested that this problem, in part, is due to inadequate materials and poor spelling instruction**.**

Inherent Difficulties of the English Language

Spelling may be a more difficult than reading (Bosman & Orden, 1997). While words can be recognized when reading through relatively small sets of critical features from phonological, syntactic and semantic knowledge, words must be remembered in a precise order to spell them correctly. Without this knowledge, spelling even the most basic words becomes overwhelming to the struggling speller. Every classroom has poor spellers, but not all students misspell words in the same way. Their work is sometimes dominated by different error patterns, suggesting different problems as the root of their difficulty in spelling. This is not surprising since this may be due to the complexities of the English language. The alphabet has 26 letters that represent the 44 phonemes used in English speech. When letters are accurately sequenced, they can form between 500 and 2,000 spellings to represent those 44 phonemes in the English language. Jorm and his colleagues (1983) discuss other challenges of the English language at length. For example, an exception to some spelling rules:

The sound /t/ is written as *t, d* or *tt.*

The sound /k/ is written as *c, k, ck or ch.*

The sound /s/ is written as *s, c*, or *ss.*

Moreover, most sounds can be represented several different ways in print. The word *cat* could also be written as *katt* or *kat.* Similarly, *gear* could be written as *gere* or *geer.* The position of a sound in a word can also influence the way it is written. The word

cat could not be written as *ckat* because *ck* never occurs at the beginning of words. However, in the word *tack, ck* is an accepted spelling for exactly the same sound. So with the ending *-ght* of *sight, bought* and *caught*. Lastly, the etymology of the language also makes it difficult.

Although English is a Germanic language, related to modern German and Dutch, it has borrowed heavily from other languages such as French and Latin. The spelling of some of these borrowed words diverges from the usual English orthographic patterns, such as the examples mentioned above. Thus, we have a number of irregular words that do not correspond to their representative sound, words like *debt* with a silent letter *b*, *doubt* spelled with a *b*, *scissors* with a *c*, and *island* with an *s*. The English language has also incorporated words such as the Greek *pneumonia*, with a silent *p*, or the French *parfait*, with a silent *t*, all letters that would have normally been pronounced in English. Such inconsistencies as these within the English language can cause further problems for spellers (McAlexander, Doble, & Gregg, 1992).

The complexities of the English language can be tricky for some regular education students. Students with learning and behavior problems, however, usually find it more difficult to remember, select, use, and discriminate between letter sounds, rules, and relationships among our complicated language. These complexities would frustrate the already struggling speller.

Relevance of the Problem

According to the Individuals with Disabilities Improvement Act (IDEIA, 2007), all states have to report disability data in 13 categories: (a) specific learning disabilities,

(b) speech or language impairments, (c) mental retardation, (d) emotional disturbance, (e) multiple disabilities, (f) hearing impairments, (g) orthopedic impairments, (h) other health impairments, (i) visual impairments, (j) autism, (k) deaf-blindness, (l) traumatic brain injury, and (m) developmental delay. However, for the purposes of this literature review, only descriptive and intervention studies of students with mild to moderate learning difficulties and behavior problems will be examined. This decision was based, in part, on statistics provided by the Department of Education (DOE). The DOE states that the 'specific learning disabilities' category represents half of all students served and that the number of students ages six to 21 with disabilities served under IDEA has continued to grow at a steady rate, rising 28.4% since 1992 (USOE, 1992).

A learning disability (LD) is sometimes described as a disorder that affects a person's ability to interpret either what they see or hear or have difficulties in linking information from different parts in the brain. These deficits can arise in many ways, such as difficulties with written and spoken language, self-control, attention, coordination and poor multi-tasking (Matthews, 2003). Because the definition of LD is rather broad, it covers a large number of students being served cross categorically in the regular education classroom today. Since students with learning and behavior problems encompass many similar characteristics, this group has the largest number of students being served in the regular education classroom.

Other disabilities can be related to the term mild learning and behavior problems, such as ADD or ADHD, mental retardation, behavior disorders, and students "at-risk." ADD or ADHD, is a disorder that interferes with a students ability to regulate activity by being hyperactive, impulsive or inattentive (Mathew, 2003). Students with mental

retardation are characterized by significantly subaverage intellectual functioning and have limitations in adaptive skills. Students with behavior problems (also known as behavior disorders or emotionally conflicted) are also included because their behavior interferes with their academic processes. These students have an inability to learn which cannot be explained by intellectual, sensory or health factors. They also display inappropriate behaviors under normal classroom conditions, and are sometimes described as moody or depressed. Students who are described as "at-risk" have a range of characteristics. Low academic achievement, grade retention, truancy and behavior problems are considered common among students who are at-risk for failure (Henley, Ramsey, & Algozzine, 1999). All of these characteristics encompass the larger definition of students with mild learning and behavior problems.

Inherent difficulties of the English language may lead one to analyze how spelling deficits can impede the learning of young children and follow them into adulthood. Spelling is an integral part of a student's learning. Students' ease of spelling in early grades ensures later ease of reading and writing, and allows for faster comprehension, all while using complex metacognitive skills for higher order thinking. It should be noted that spelling deficits are not just limited to reading and writing, but can also prove to be a hindrance to other academic areas (e.g., social studies, geography, language arts).

A study by McKinney and Feagans (1984) implies that the majority of students with a learning disability experience most of their academic difficulty in the areas of reading, writing and spelling more so than any other area. Since spelling is basic to the English language, it has been found to facilitate reading and writing acquisition (Graham & Voth, 1990; Uhry & Shepard, 1993). It can be concluded that spelling is an important

area of remediation for students with mild learning and behavior problems. The following sections will discuss the relationship spelling has with reading and writing.

The Connection Between Spelling Deficits and Reading

Despite national attention on the importance of teaching reading, many children still continue to struggle with reading. According to the National Assessment of Educational Progress, 40% of U.S. fourth-graders read below a basic level and have "… little or no mastery of the knowledge of skills necessary to perform work at each grade level" (NCES, 1999). Furthermore, evidence has been accumulating over a number of years that many children are not mastering essential reading skills. The National Assessment of Educational Progress (NAEP, 1996) showed that 36% of nine-year old students failed to reach the level of "… partially developed skills and understanding." And even more alarming, a mere 7% could not complete a simple reading task. Overall, national longitudinal studies conclude that more than 17.5% of America's school children (around 10 million) will encounter reading problems in the first three years of school. These students may have reading and spelling difficulties because they have failed to move through the developmental stages necessary to spell.

Researchers have found that children gradually move through certain steps to acceptable writing. Sulzby (1985) identified four phases of writing. In the first phase, student's messages consist of scribbles. Next, their scribbling begins to resemble the writing system. Third, their scribbling turns into letter forms, which are replaced by letters. Lastly, formed letters move into sounded letters in words, and finally to spelling. Her research suggests that young children (when going through these developmental stages) would benefit from spelling instruction that explicitly teaches letter sound

correspondence and motor skill development. This instruction would be the beginning of acquiring pre-requisite skills necessary to be a good speller.

Considerable research has shown that there is a strong correlation between spelling and reading (Ehri & Roberts, 1979; Jorm, 1981; Juel, Griffith, & Gough, 1986; Read, 1971, 1975). Read was certainly the groundbreaker in studying young children's spelling development. In 1975, Read began to observe the invented spellings of young children. He was interested in what children's spellings might reveal about how they categorize speech sounds in English. An interesting example taken from Read's work is provided below:

> *Hoo lics hane! Hoo lics hane was ov pona time there was ov ber hoo loved hane the ead*
>
> (Who likes honey! Who likes honey? Once upon a time there was a bear who loved honey. The end.)

Read and colleagues showed that many children applied phonological knowledge in a systematic manner in their spellings. Moreover, he found that children's omission or letter substitutions in their spelling were not random. This research laid the groundwork for future studies that focused on defining and describing the importance of phonology and its relevance to how children spell. Current research points to the importance of teaching phonology within spelling instruction, particularly to students with learning and behavior problems.

Ehri and Roberts (1979) found that students who learn to read a set of words were influenced by their memory for that particular word's spelling. In their study, one group of first-graders with LD practiced reading 16 words in a written sentence and another

group practiced those same words in isolation on a list. Later that day, a spelling test was given. The authors found that students who had read the words in isolation produced significantly more letters correctly than those who had read the words within a sentence. This particular piece of research suggests that spelling programs should be designed in such a way that words are first learned in isolation in order to ensure accuracy and then later placed in a writing or sentence activity after a student has achieved mastery.

Morris and Perney (1984) studied a group of 75 general education first graders' ability of word recognition (reading) and spelling ability in belief that they share a common knowledge base. At the end of the year long study, the authors found that spelling was an indirect measure of current reading ability and was a good predictor of later reading achievement. They argue that spelling instruction should be continually taught in conjunction with reading and not laid aside during the elementary years in hopes that spelling will be "caught" through other subject areas. Explicit spelling and reading instruction taught together can enhance a student's academic performance. The link between spelling and reading for students considered to be "at-risk" becomes apparent.

Uhry and Shepherd (1993) wanted to provide 22 first graders with LD segmenting and spelling training as a supplement to classroom instruction in order to study the effects of a sounding-out and blending-strategy. After six months, the authors found that spelling instruction not only improved the children's ability to read words, but also their ability to decode words. Therefore, teaching students to sound out and blend words increased fluency and the likelihood they would transfer those skills beyond spelling and into reading.

A study in 1987 by Ehri and Wilce examined the effects of spelling training on word reading in kindergartners. These students were reported to have little ability to read words and no decoding skills. Group one was taught to spell words phonemically, while group two practiced phoneme-grapheme associations in isolation. When students were asked to read similarly spelled words, the phonemic group (group 1) outperformed group 2. The authors felt that the spelling instruction improved the students' working knowledge of the alphabet. Thus, they were able to form more grapheme-phoneme connections to remember how to read words, even words they had never seen.

Students with mild learning and behavior problems experience great difficulty in learning to read. To be a successful speller at an early age, students need to understand how the sounds in words and letters relate through explicit teaching rather than traditional methods. Since spelling instruction allows for the opportunity to combine graphemic awareness through phonics instruction, it serves as an appropriate link for teaching spelling and reading together.

The Connection Between Spelling Deficits and Writing

Today, written communication skills are critical to the demonstration of what has been learned in the classroom and in many other settings. Those skills also provide different avenues for sharing thoughts and feelings between individuals. Writing has become a critical life skill that is linked to literacy (Hooper, 2002). Unfortunately, the longitudinal study by the National Assessment of Educational Progress (NCES, 1999) revealed no overall improvement in the previous years of fourth-grade students' writing scores, with only 23% of the fourth graders scoring at or above proficiency.

Writing, sometimes called transcription, involves transforming the words that the writer wants to say into written symbols on the printed page (Berninger, Fuller, & Whitaker, 1996). Accurate spelling plays a key role in the development of writing skills. Templeton (1991) found that students who are good spellers are able to express themselves in writing more effectively than poor spellers. The relationship between poor handwriting and spelling has also been a frequent topic among general and special education researchers. Spelling contributes to writing through fluency so the speller is not too focused on the mechanics of spelling (Graves, 1983). Overall, studies have shown that writing becomes fluent when a student is not overwhelmed by the mechanics of spelling (Graham, Schwartz, & McArthur, 1993).

Myklebust (1965) was one of the first researchers to stress the relationship between handwriting and language among students with learning and behavior problems by outlining the breakdown that occurs between handwriting and spelling. He found that many children who can easily learn the auditory and visual parts of words sometimes cannot convert these into motor patterns.

For example, in order to write a letter, a child must attach a verbal label (name or sound) to a letter form, have an accurate, precise representation of the letter form in memory, and be able to access that letter and retrieve it (Hooper, 2003). Abbott and Berninger (1993) generated a structural equation model (SEM) to investigate this relationship between spelling and handwriting. Their study included 600 children in grades one through six in general and special education. The authors found that the path between orthographic coding and handwriting was significant at each grade level. Not surprisingly, a student's fine motor skill was also found to contribute to handwriting

performance. However, the authors acknowledge that poor handwriting may be a result of weak letter knowledge rather than a result of motor difficulties.

When the act of handwriting and spelling is demanding, students minimize their use of other writing processes, such as outlining or revising, because these processes require a considerable amount of cognitive energy. Furthermore, mastery of transcription skills is thought to be important to writing because the execution of these skills consumes considerable cognitive resources, especially if they cannot be carried out fluently and efficiently. For students who have not yet mastered the mechanics of writing, consciously having to attend to those skills of getting language onto paper may overwhelm the writer's processing memory, interfering with higher order skills such as planning and content generation (Graham, 1990).

Consistent with earlier findings, McCutchen (1996) also proposed that the act of spelling and handwriting are so demanding for young writers that they minimize the use of other writing processes, such as planning and revising, because they exert considerable processing demands as well. Berninger, Mizokawa, and Bragg (1991) further proposed that difficulties mastering transcription skills can lead children to avoid writing and develop a mind-set that they cannot write, thus hindering their writing development. Spelling and handwriting skills are described as being 'interwoven' in a book titled *Classroom Assessment for Students with Special Needs in Inclusive Settings* by Spinelli (2002). When a student has difficulty in one aspect (or component) of writing, other aspects become affected, limiting them in the ability to communicate effectively. These components of the spelling and handwriting process are depicted in a figure by Spinelli.

Deficits in some of these component processes have an effect on the psyche of the speller.

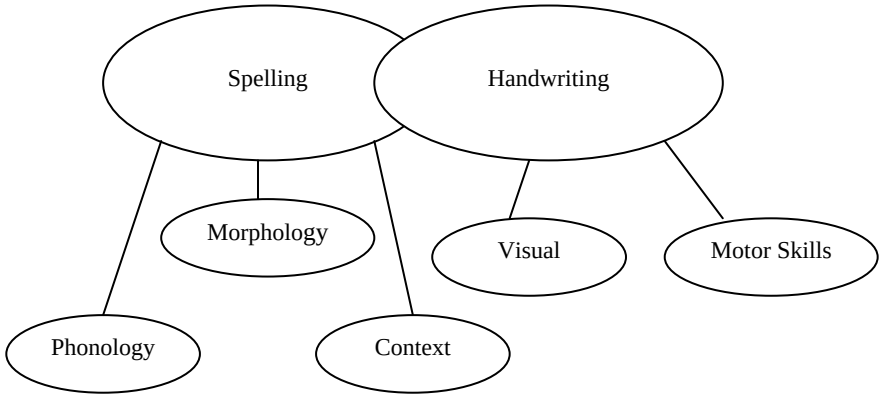

Figure 1. Essential Components of the Spelling and Handwriting Process

Note. From *Classroom assessment for students with special needs in inclusive settings* (p. 331) by C. Spinelli, 2002, New Jersey, Prentice Hall. Copyright 2002 by Pearson Education Inc. Reprinted with permission.

Graham, Schwartz and MacArthur (1993) examined attitudes towards writing for students with and without disabilities. In comparing the regular education students to the students with LD, the normally achieving students were more likely, when asked to define good writing, to stress the developing parts of composing a paper (has a beginning, middle, and end) whereas students with LD would stress features such as print or cursive, neatness and spacing. The students in this study were also asked questions such as "What is good writing?" or "What do good writers do?" The students with LD were at least three times more likely to emphasize strategies such as write bigger or write neater. Their

normally achieving peers were more likely to emphasis strategies such as outlining or revising a paper. Overall, students with learning and behavior problems have a less mature conceptualization of writing and the composing process than their normally achieving peers (i.e., writing neater v. revising work).

In conclusion, spelling is a critical feature for improving the reading and writing skills of students with mild learning and behavior problems. All of these studies reported spelling ability and its effects on reading and writing among general and special education students. These studies also described the difficulties in remediating these problems. Unfortunately, studies find that students with mild learning and behavior problems find it difficult to describe a strategy when asked about their spelling (Darch et al, 2000; Graham, 1999; Weiner, 1994). These difficulties are sometimes the foundation to perpetual academic failure. It is very important that studies focus on effective teaching strategies for students within the context of spelling.

Definition of Spelling Terms

For ease of reading, some critical terms in the area of spelling instruction have been defined. These terms are important to understanding the area of spelling and its impact on students with learning and behavior problems. These terms are also pivotal to understanding specific spelling program designs and sequences for students with disabilities.

Basal reader approach — A method of teaching reading in which instruction is given through the use of a series of commercial programs. The authors of the series determine sequence of skills, vocabulary, content, and activities. These programs usually

include activity books or workbooks. They are typically used in accordance with the students' grade level, not their achievement level.

Direct Instruction — A model for teaching that emphasizes well-developed and carefully planned lessons designed around small learning increments of clearly defined and prescribed teaching tasks. It is based on the theory that clear instructions eliminate misinterpretations and can greatly improve and accelerate learning. The purpose of direct instruction is to promote proficient academic success to all students. This style of teaching is among the most researched and validated practices in the literature.

Fluency — The speed at which a student produces a letter or letters. If students are fluent spellers, they continuously increase their skills in spelling and reading to automaticity. Automaticy improves their chances of increasing those metacognitive skills necessary for advanced writing and comprehension skills.

Grapheme — A written symbol that represents an oral sound. For example, *a* says */a/.*

Invented Spelling — The process by which emergent readers and writers communicate in writing by using their growing linguistic knowledge, through their immersion into print and other class content during primary years. Some educators believe that spelling does not need to be taught and that spelling sounds, rules, and usage, will be "caught" throughout the day in a typical classroom.

Legibility — The clarity and correctness of letter formations. Some studies have shown that neat handwriting correlates with fluency and ease of letter production. Students with disabilities sometimes have difficulty with producing legible handwriting.

Morpheme — The smallest unit of meaning. SRA's program titled "Morphographic Spelling" teaches a variety of morphographs such as prefixes, suffixes, and word bases. Plus, small sets of rules are taught for combining morphographs so that students learn a spelling strategy they can apply to thousands of words. For example, students are taught that *re-* means "to do again" or that *-ed* means "in the past." This program is effective in teaching older students to spell and students can spell over 12,000 words by the end of the program.

Morphology — The structure of words in terms of morphemes. The word *walking* consists of two morphographs, *walk* and *ing*.

Orthography — The cognitive act in which the child coordinates several sources of word knowledge, including phonemes, knowledge of spelling patterns, and syntactic knowledge of the word (Wong, 1986).

Orthographic images — The process of retaining in memory the visual sequences of a word.

Phoneme — The smallest unit of sound. Phonemic awareness is important for when students sound out words to spell them or to visually assess their correctness.

Phonics — The establishment of the sound (phoneme) to the written symbol (grapheme). This recognition aids in increasing fluency as it relates to spelling.

Spelling — The ability to recognize, recall, reproduce, or obtain orally or in a written format the correct sequence of letters.

Whole Language — This approach to spelling relies on language being learned by whole word (not part) recognition skills being picked up by the child in the context of

actual reading, writing and immersion in a print-rich classroom. The child is said to learn the concept of a story by being surrounded by language.

Typical Sequences for Learning to Spell

Spelling can be defined as the formation of words through the meaningful arrangement of letters (Mercer & Mercer, 1998). Orthography is the cognitive act in which children coordinate words by phonemes, knowledge of spelling patterns, and syntactic and semantic knowledge (Wong, 1986). Initially, children hear, speak, and read mostly one- or two-syllable words of Anglo-Saxon origin. During school however, students are exposed to longer, more complex words of Latin and Greek origin by the fourth grade (Nagy, Berninger, Abbott, Vaughan & Vermeulen, 1995).

Teaching children to read and write is one of the primary goals in classrooms today. Students must not only learn how to write and spell words, but maintain a focus on important aspects of writing. For example, focusing on organization, form and features, purposes and goals of the text, and the readers need to fulfill a task (Harris, Graham, & Mason, 2003). Although learning to spell is generally described as gradual, an analysis of how children spell was investigated in detail by Ferreiro (as cited in Silva & Martins, 2003). The results of her research were that children's knowledge about written language evolved around three levels of conceptualization.

The first level of conceptualization can be characterized by young children differentiating between drawings and writing. Along with this, the child also comes to understand that a letter or series of letters is capable of sending a message. At the second level, children work at refining the order in which they classify the letters and sounds they know. For example, a child might write "bt" for "beat." Third, children relate oral to

written language. Children begin to try and differentiate between the whole word and parts of the word (Ferreiro, 1988).

Ehri (2000) describes the spelling process another way. The beginning speller is usually taught explicit grapheme-phoneme relationships. These associations become easier if children know the names of letters. Letters such as /t/ and /k/ are easier because they contain relevant sounds. That is, their name and sound are similar. Next, children attain a systematic alphabetic knowledge that includes combined letters that would be considered irregular from a grapheme-phoneme perspective. For example, the phoneme /k/ can be spelled by a number of different graphemes such as *c, k, ck or ch*. Older students typically try to spell a word by recognizing its relationship to other similarly spelled words, then they remember this spelling and not the incorrect one. Thus, students learn to eventually pull the correct spelling of words from memory. This process of retaining in memory the visual sequences of words is referred to as orthographic images (Ehri, 2000).

Interestingly, Ehri (1992) implies that phonemes containing many graphemic options are harder to retrieve from memory. For example, words that contain silent letters (muscle, pneumonia) or doubled letters (unnecessary, vacuum) might be difficult to remember. Uncommon letter sequences are also likely to confuse the speller in words like *lettuce, tennis, pigeon, bargain,* and *limousine*.

Graham (1999) simplifies the spelling processes even further by saying that the students' first search their memory to see if the spelling of the word is stored there. If not, a spelling is generated by segmenting the word's pronunciation into phonemes and accessing corresponding graphemes. Once the spelled word is generated, it is usually

verified by visually checking to see if it looks right. J. Donald Adams was once quoted as saying that good spellers need "… the eye of a hawk, the ear of a dog, and the memory of an elephant" (Lederer, 1987, p. 161). Finally, spellers learn to spell through the phonological segments represented in English orthography through practice. Spelling requires phonological and orthographic coding that involves the print and spoken word from memory (Gregg & Mather, 2002).

Summary and Conclusion

The purpose of this section was to present the current problems in spelling that all students encounter, especially students with disabilities. The relevance of trends in spelling data were analyzed followed by an in depth discussion of its relationship to reading and writing. The spelling performance of normally achieving students was described and the challenges that face students with mild learning and behavior problems in the area of spelling were outlined.

The purpose of the next section is to discuss in detail the characteristics students with mild learning and behavior problems might exhibit when presented with an academic task. There are three main areas of particular interest. The first area describes personality and academic characteristics of students with mild learning and behavior problems. This includes domains such as attention, memory, intelligence, anxiety and self-concept. The second area will provide the background for a review of descriptive and intervention studies that examine how students with and without disabilities perform spelling tasks. These studies will focus on how well students perform under different instructional approaches. Although chronologically the studies within this section are

early, they are the most recent and relevant. Third, a detailed overview of spelling programs will be examined.

II. REVIEW OF THE LITERATURE

Characteristics of Students with Mild Learning and Behavior Problems

As discussed earlier, a learning disability is a broad term that covers a pool of possible causes, symptoms, treatments and outcomes. Since a learning disability can appear in so many forms, it becomes difficult to diagnose possible causes (Matthew, 2003). However, many studies over the past few decades have tried to explore, define, and explain characteristics of students with disabilities in order to provide guidelines for teachers and professionals. A study by the Commission on Excellence in Special Education (2001) demonstrated the differences between students who have learning disabilities and students who do not on a variety of cognitive learning characteristics. Additional studies revealed have that students with disabilities not only have cognitive deficits, but may also have deficits in other areas such as attention, memory, self-concept, and anxiety (Bender, 2004).

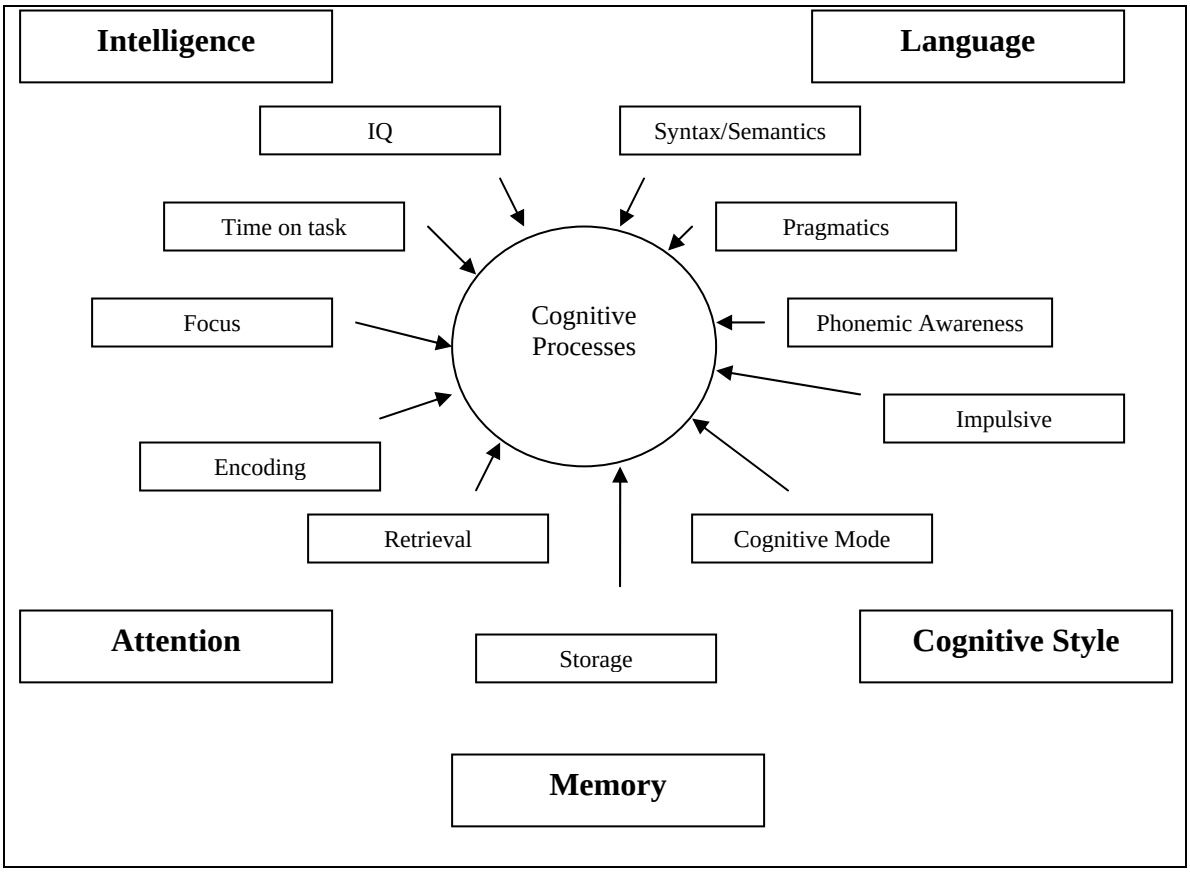

Figure 2. Cognitive Processes of a Student with Learning Disabilities

Note. From *Learning disabilities: Characteristics, identification, and teaching strategies* (p. 72), by W. Bender, 2004, Boston: Pearson Education, Inc. Copyright 2000 by Pearson Education, Inc. Reprinted with permission.

Each of these domains are an important aspect in understanding the student as a whole. As seen in Figure 2, each component works intermittently and can have an indirect or direct effect on the learner. For instance, some consider attention so essential, that without it little learning can occur. Research on students with mild to moderate disabilities with attention disorders are viewed by some investigators as a defining

characteristic of many students with disabilities (Richards, Samuels, Turnure, & Ysseldyke, 1990). Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most prevalent disorders diagnosed in children, characterized by excessive activity, short attention span and impulsivity (APA, 2000). Moreover, students with ADHD have been found to have high rates of learning difficulties well above their general education classmates (Lambert & Sandoval, 1980). Studies done by Barkley (1981) and Holborow and Berry (1986) estimate the percentage of children with ADHD who are likely to also have learning problems range from 25% to 60% of the ADHD population.

An early study by Schworm (1979) focused on the effects of attention on the decoding skills of children with a learning disability. Twenty-three children from grades two through six from six elementary schools were selected. Students were chosen by four sets of criteria. All students had to be achieving at least one grade level below their current grade placement; read less than 100 words per minute with less than 90% accuracy; exhibit a consistent failure to name the spelling patterns *ai, ee, ea, oi, ou, au, oo, ue, oa, oy, ap, et, ip, op, ow,* and *ut*; and, mispronounce 20% of the words from tests designed for the study. Students were then randomly assigned to group 1 or group 2.

The treatment was designed to focus the students' attention on spelling patterns and the medial positions of words. The procedure consisted of two strategies applied to both groups and a third strategy used only with group two. The first treatment trained students to name the major sounds of certain spelling patterns. The second strategy trained subjects to focus on the middle of a word when trying to decode it. The third strategy, only taught to group two, consisted of three cues to direct attention to the middle of a word. These cues include prompts that divided a word in half, between two

consonants, or between double consonants. The prompts were only provided when a student hesitated with an unknown word. Activity sheets were also provided that presented letter patterns in isolation and then the same letter patterns within a word. Correct and incorrect responses were recorded at each session. This evaluation allowed teachers to maintain or change activities for the next lesson.

The analysis of covariance (ANCOVA) revealed a significant effect for the word pronunciation test with vowel patterns, F (2,15) = 25.56, $p < .001$, and the word pronunciation test without vowel patterns, F (2,15) = 10.48, $p < .05$. These results indicate that students were able to generalize the strategy of attending or focusing on the position of vowel patterns when presented with new and previously taught words.

The author notes that in order for students with learning disabilities to be effective spellers, they need to be instructed to search, select, and use strategies necessary to spell and decode words with lots of practice. Some subjects were noted to have needed many opportunities for practice with the cues and prompts before their responses became accurate and automatic. Thus, any strategy taught to children to decode and spell words may only be as effective as the amount of attention and practice students are giving to a particular task.

Rucklidge and Tannock (2002) took Schworm's work a step further, focusing their research on reading difficulties (RD) and gender differences among adolescent students with ADHD. The study focused on 108 subjects between the ages of 13-16. Thirty-three were diagnosed with ADHD through the K-SADS and parent /teacher behavior rating scales. Those considered to have RD scored below the 25th percentile on at least one of the subtests of the Woodcock Reading Mastery Test-Revised (WRAT-3).

Four random groups were formed to have two ADHD groups (ADHD, ADHD + RD) and two RD groups (RD, ADHD + RD). Data collection was taken during a 6-hour interview in which tests and tasks were given to the student. These tests included the Wechsler Intelligence Scales for Children (WISC-III, Wechsler, 1991); four tests of the Rapid Automatized Naming (RAN); and The Stroop Color and Word Test (Golden, 1978). After each individual interview, the tester rated the student on all 18 DSM-IV ADHD criteria while administering the previously mentioned tests. Overall, both ADHD groups were found to have slower processing speed, be slower at naming objects and have greater variability in responses. The data from both RD groups suggested they were slower to name letters and color words.

The authors suggest that the naming of letters and words takes more effort for students with a reading disability and how the disability impairs their ability to perform simple tasks. When both RD + ADHD are present, a student will likely have more prevalent difficulties than their peers with reading disabilities. One limitation to this study was the small number of students who only had RD, leaving the possibility that group differences were from a lack of power, and not a reflection of group differences.

A study by Richards, Samuels, Turnure and Ysseldyke (1990) investigated: (1) the extent to which students with LD are able to sustain their attention or are distractible and, (2) whether or not they process information at different rates than their normally achieving peers. The subjects were students in fourth-, fifth-, and sixth-grades. Twelve students were female and 18 were male, making a total of 30 for the study. All had been diagnosed as having a learning disability. Eighteen out of the study were also diagnosed as having both a learning disability and ADHD. The authors found that students with LD

alone had attention difficulties but with the addition of ADHD, lent to a greater significance in lack of attention. Students with LD also displayed longer response times on the majority of the tasks, suggesting that students with LD process information slower than their normally achieving peers.

Unfortunately, some students might have attention difficulties coupled with another disability that could compound their reading and spelling ability. A study by Ackerman, Dykman and Gardner (1990) examined one group of students with ADD, and another group with ADD and dyslexia. The purpose of their study was to focus on the phonological processes and cognitive differences between ADD children with and without developmental reading disorders. The participants in this study were 177 elementary students, almost half (n = 82) had been diagnosed as having dyslexia. These children had also been evaluated for school related problems. All had met the DICA (Diagnostic Interview for Children and Adolescents) criteria for developmental academic disorders, conduct disorders, anxiety disorders, adjustment disorders and depressive disorders. Each student was between 7.0 and 11.0 years in age and had a Full Scale IQ $\geq$ 85. The Bradley Test of Phonological Sensitivity (1984) was given to each student by trained technicians. The Bradley Test is divided into three sections and focuses on a student's ability to pick out the word that does not rhyme with the others in a given list. In part one, the odd word does not rhyme with the others because the last sound is different (i.e., *leg, peg, hen, beg*). In part two, the odd word does not rhyme and has a different middle sound (i.e., *pat, bat, fit, cat*). In the last part, the odd word has a different first sound than the other words (i.e., *bud, bun, bug, rug*). Prior to each section given, the

student was allowed two trials. If they did not respond correctly, the correct answer was given and a second try was allowed.

The authors found that 46% of the students with dyslexia exhibited a modest to severe impairment on a sample auditory test of phonological sensitivity to rhyme and alliteration. Furthermore, those students read and spelled roughly one-half standard deviation below the other group despite having statistically equivalent Verbal and Sequential Memory Scores. This study found that students who have difficulty discriminating the non-rhyming word in a pattern are at a high risk for reading and spelling difficulties. The authors suggested implementing a study that aims at teaching a remedial reading or spelling program that emphasizes phonological awareness. Moreover, spelling achievement should be measured through mastery and automaticity of spelling before a student is taught a new skill.

Swanson and Ramalgia (1992) conducted a similar study, examining the relationship between memory and spelling tasks for older students with and without disabilities. The subjects were 31 students in the seventh-, eighth-, and ninth-grades with RD, and 32 students who were younger, but were matched to the reading level of their RD peers. There were a total number of 63 students included in the study. The children with a RD were identified through the school's formal educational assessment as having LD and had met the federal definition. Subjects were placed into four groups according to their grade-equivalent scores on the WRAT-R. All groups received the auditory and visual presentation of weekly spelling words. All groups also received three types of instructional conditions of phonetically dissimilar words, consonant similar words and rhyming words. Friday spelling tests of 60 words were given every four weeks. After

each test, subjects were presented with a short list of words and asked to say each word they knew. Total testing time lasted 40 minutes for each student.

In general, the authors found a relationship between memory and spelling performance of all groups, but to a more marked degree among the groups with a RD. This study suggests that when spelling performance is examined, phonological deficits may exist between memory and spelling for students who have a RD. This difficulty may arise from teachers using a basal speller that is matched for grade level and not spelling ability.

Students with disabilities who have attention difficulties and perform poorly on spelling tasks may also have trouble with remembering the steps and procedures to a given task. Weaknesses in sequencing and memory have been identified by many researchers as being an underlying deficit in students with learning disabilities (McLeod & Greenough, 1980).

Several studies have also suggested that children with a reading disability (RD) produce misspellings that are qualitatively different from those students who are not labeled with a disability (Boder, 1973). McLeod and Greenough (1980) focused their study on memory, but also examined the relationship of sequencing as a part of memory in good and poor spellers. Eighty children with a diagnosed LD were included in the study. Forty students were in first-grade and 40 were in fourth-grade. Both grades had the 40 children divided into 2 groups; the good spellers and the poor spellers, making a total of 4 groups for the study. Good spellers (regardless of grade level) showed significantly better gross memory for spelling words aloud and recalling printed words. The good spellers benefited from over practicing spelling words by internalizing sequences to spell

well and therefore were viewed as efficient memorizers. The author says, “In short, one cannot be expected to repeat five digits in correct sequence if one’s gross memory extends only to four digits” (p. 13). Sequencing and memory functions appear to be closely related. Understanding the memory capabilities of students with disabilities would benefit the instructional design of future spelling programs.

Students with mild learning and behavior problems usually have a major academic skills deficit in at least one of the main areas of reading, writing, or arithmetic to a marked degree. Teachers know that their students are behind academically, but sometimes fail to understand just how far behind their students are. Teachers must become conscious of the complexities of performing an academic task. For example, metacognition (i.e., the process that children think about and plan their actions when completing a task) is a process that is automatic to most students, but can prove difficult for some students. For instance, when reading a student must be able to simultaneously:

- focus attention on print and control eye movement across the page,
- recognize the sounds and associate them to letters,
- understand words and grammatical rules,
- build ideas and mental images,
- compare new ideas to already acquired knowledge, and
- store ideas in memory.

Such cognitive skills require a finely coordinated network between vision, language, and memory that some students just do not have. Research by Torgensen (1977) demonstrated that children with learning disabilities do not rely on their metacongitive abilities at the same frequency or as accurately as their normal achieving peers. Poor

performance when presented with a task may be due to the students' failure to engage in the task by using previous taught strategies or other intelligence processes.

Intelligence is another characteristic that distinguishes students with disabilities apart from their normally achieving peers. Even though there are many definitions of intelligence, Western society has generally defined it as a large multi-piece construct that when measured on an IQ test represents the sum of all those abilities.

Some studies predict that within the English language, students' with a lower verbal IQ score may be related to students labeled as having a learning disability. For instance, a longitudinal study by Bishop and Butterworth (1980) suggested that students with a low verbal score may have a decline in their reading achievement over time. They found that the largest discrepancy (between reading and IQ) was between eight-year-old children versus the examined four-year-old. This information is critical to understanding that when providing reading and spelling instruction, it is important to implement an intervention when academic problems first arise. When students with mild to moderate disabilities are expected to attain those reading and spelling skills through other content areas, they only fall further and further behind academically. Spelling instruction should contain exercises that help build a students ability level in phonemic awareness, memory and sequencing in early grades.

Share and Silva (1987) also found that a student's language skills, specifically vocabulary and syntax scores, increasingly declined as he or she aged. These discrepancies were larger among the students with mild to moderate disabilities compared to their typically achieving peers. Therefore, it is imperative to recognize these

characteristics exist in order to provide effective instruction early in a student's academic career.

Students who have attention difficulties, poor memory, and low academic achievement may also exhibit characteristics of low self-concept and anxiety in academic settings and can be detrimental to the psyche of the speller. The consequences of failure can be either motivating or a hindrance to their learning. Margalit and Zak (1984) compared the self-concept and anxiety in children with LD and without disabilities. Anxiety in students was observed as crying, worrying, withdrawal, avoidance or inappropriate behaviors. One hundred students with LD and 118 regular education students ranging in age from 6-13 years of age participated in the study. The findings of this study were two fold; (1) students with LD had higher levels of anxiety related to feelings of events in which they felt they had no control, and (2) the students' level of self-concept correlated with their feelings of academic dissatisfaction. The authors suggested that intervention programs should focus on reinforcing the student with LD through performing relevant tasks, thinking critically about the content, and giving them the feeling of being in control of their academic fate. Without high levels of self-efficacy, a student may not make the effort needed to complete a task. Schoolwork should challenge students rather than frustrate them in order to increase their autonomy.

In a similar study, Margalit and Shulman (1986) examined the autonomy and anxiety of students with and without disabilities. This study only focused on 40 males between the ages of 12 and 14. All subjects were administered two questionnaires individually to assess their degree of autonomy and describe their anxiety when in certain academic settings. The students with LD were found to have lower levels of autonomy

and higher levels of anxiety ($F(1,38) = 6.99$, $p < .001$). They were also found to exhibit higher levels of stress when presented with interpersonal situations or unexpected events. It was suggested that students with learning and behavior problems be taught independence in the classroom to decrease their learned helplessness.

In summary, students with mild learning and behavior problems have more spelling difficulty than their normally achieving peers. As supported by the literature, these students exhibit deficits in attention, memory, and sequencing of skills. Moreover, these characteristics in turn play a role in the psyche of the speller. Thus, students with disabilities might exhibit higher levels of anxiety and weaknesses in autonomy when presented with an academic task.

Studies Comparing Students With and Without Mild Learning and Behavior Problems

A large body of research over the past few decades has theorized the causal link between phonological processes, reading, and spelling skills. Throughout this body of literature, studies including evidence from correlational, experimental, and intervention studies describe these differences among students with and without mild learning and behavior problems (Swanson & Ramalgia, 1992).

As discussed earlier, children with LD or even those with low academic achievement appear to have low academic self-concepts. These students are also more likely to use fewer metacognitive strategies (Pintrich, Anderman, & Klobucar; 1994) to solve problems and attribute their success in the classroom to luck (Durrant, 1993).

Sideridis (2002) provided a longitudinal study that compared the motivation of students at-risk to those students with high language skills in regards to goal setting.

Participants were 202 elementary students. Twenty-two were at-risk for a reading or spelling disability and the other 180 were above average in reading. The one-year study included measures such as a questionnaire, current academic achievement, behavioral intentions (to study hard) and goal importance. Half from each group were taught goal setting skills for the year. A structural equation model (SEM) was used to analyze the direct or indirect relationship between the variables.

The author found that students with low and high language skills had significantly different ideas about motivation. As with other studies, the students at-risk had lower perceptions of control over their academic performance and seemed to rely heavily on others for help (i.e., dependent on authority figures). Students with LD were less likely to set goals compared to their normally achieving peers. However, by students setting their own goals, academic performance and motivation to complete tasks did add to their sense of control and increased their academic performance. This concept was to a more marked degree in the students who were at-risk for reading and spelling difficulties. Goal setting among students who are at-risk may serve to diminish the achievement gap between them and their regular achieving peers. Although this broad study looked at differences between goal setting in any content area, the lack of autonomy among students with disabilities may prove to be detrimental to their success. This study showed that students benefit from setting goals, but one has to consider the possibility that without adult supervision, students may not implement them in the future.

A more content focused study by Savage, Frederickson, Goodwin, Patni, Smith, and Turesley (2005) explored the relationship between rapid automatized naming (RAN) among below average, average, and above average readers and spellers. In addition,

nonsense word reading (pseudo word), phonological awareness, short-term memory, and working memory were measured. Participants were 61 children, 35 females, and 26 males ranging from third through fifth grade. A battery of seven tests were administered to assess their reading, spelling and comprehension levels. The seven measures included non-word reading, spoonerisms, digit naming speed, postural stability (automaticity), word identification, word list recall and recall of digits backwards. Students' standardized scores were used to divide them into below average, average, and above average groups. Children who scored within one SD of the mean were classified as average.

The analysis for reading accuracy produced three variables (spoonerisms, non-word reading and naming speed) that were found to contribute significantly to separating the groups. The below average group had the lowest mean (M = -1.99) and the above average group had the highest (M = 1.79). When spelling was examined as a lone variable, spoonerisms and naming speed were found to be statistically significant in increasing the separation between the groups. Furthermore, low verbal short-term memory scores predicted below average spelling ability over phonological processing and naming speed. Postural stability was not a good predictor of reading and spelling ability among all three of the groups. This study suggests that RAN still remains a reliable predictor of spelling performance and that intervention studies should focus on teaching phonological awareness and pseudo word reading to enhance the reading and spelling ability of students with mild learning and behavior problems.

Use of Strategies by Students With and Without Mild Learning and Behavior Problems

Even though professionals agree that certain remedial strategies should be implemented when designing spelling instruction, research on the application of these

ideas into instruction is broad. Recently, researchers have attempted to isolate instructional variables in order to improve the spelling performance of all types of students. Teachers are confronted with the problem of how to design and implement effective strategies that are academically meaningful, transferable to other subjects and fun for individual students.

One problem that many students with spelling difficulties encounter is having too many new and difficult words to learn each week. Some researchers have suggested reducing the number of words given on a weekly word test. Instead of twenty words a week, teachers could introduce daily groups of 4 to 5 words. Additional time should also be given in order to review the groups that were introduced the previous days. This method of dispersion is thought to eliminate spelling errors and not overwhelm the student (Fulk & Starmont-Spurgin, 1995).

Bryant, Drabin and Gettinger (1981) take this theory one-step further and examine the degree to which varying the number of spelling words taught relates to the percentage of words spelled correctly. Sixty-four children with LD were divided into three treatment groups that only differed in the number of irregular spelling words taught (i.e., three, four or five per day). The sample had a mean WISC-R full scale IQ of 93.1. Subjects were then randomly assigned to groups of six or less. All instruction was between 30 and 40 minutes long and included a lesson format that specifically taught irregular words. The treatment groups were: Group A (3 word unit per day), Group B (4-word unit per day) and Group C (5-word unit per day). The words used for constructing the lists were phonemically irregular words and nine common words that were dispersed among the

three groups. These common words were taught first at the beginning of each lesson. At the end of the third day, a verbal recall measure was administered to assess memory.

The results indicated that on average and regardless of group, the children learned to spell between seven and eight words correctly during the three-day period. The posttest performance of spelling the nine common words indicated that the group only taught three words a day had statistically significant scores over the other two groups. Lastly, the three-word unit group reached 80% mastery of their spelling words on the posttest. Seven to eight words a week for unit size may ensure increased academic performance among students with disabilities.

Gettinger, Bryant, and Fanye (1982) designed spelling instruction with an emphasis on unit size, but also wanted to look at the effects of distributed practice and transfer knowledge. Distributed practice is described as a technique in which students practice spelling words each day, with a new word added to the list and an old one removed once it has been mastered three days in a row. A total of 39 children with LD were randomly selected for the study. All children exhibited 10% or lower accuracy on a pretest of spelling words and achieved average intellectual functioning on standardized tests. Students had a mean grade of 2.3 (SD = 0.8; range = 1.2-3.5) and a mean chronological age of 104 months (SD = 7; range = 90-120). The children were randomly divided into two groups (experimental and comparison). The difference between the groups was the lack of distributed and cumulative practice including games or repetitive writing without feedback or emphasizing mastery. The experimental design was intended to increase the learning of phonemically regular and irregular spelling words. Lesson formats included training on both irregular and regular words, solitary word practice and

sentence practice for that particular week's word list. This was accomplished through eight 30-minute lessons of instruction in groups no larger than five. Nine 5-letter irregular words were taught over three weeks. Four spelling patterns *(ea, ai, oa, ar*) were taught in the context of eight regular words. All regular words contained four letters. Additionally, 24 regular words were used during the transfer testing.

A one-way MANOVA found significant differences between the two groups, F (2,72) = 9.48, $p < .01$). The experimental teaching produced higher spelling accuracy and transfer of spelling patterns to new words. Those students were able to learn 80% of the spelling words taught and were also able to spell 75% of the transfer words that had not been taught previously. The authors suggested using smaller unit size and distributed practice coupled with effective instruction as viable techniques for teaching students with disabilities to spell old and new words.

For some students, even a three-word unit may be overwhelming. In cases such as these, word boxes can be an effective strategy for teaching spelling. Word boxes are used to help children become aware of individual sounds to help children match sounds to print when spelling words. Word boxes have been used with young children or with children who have difficulty hearing sounds in words. Figure 3 provides an example worksheet of teaching word boxes that a teacher might introduce when teaching the word "hat."

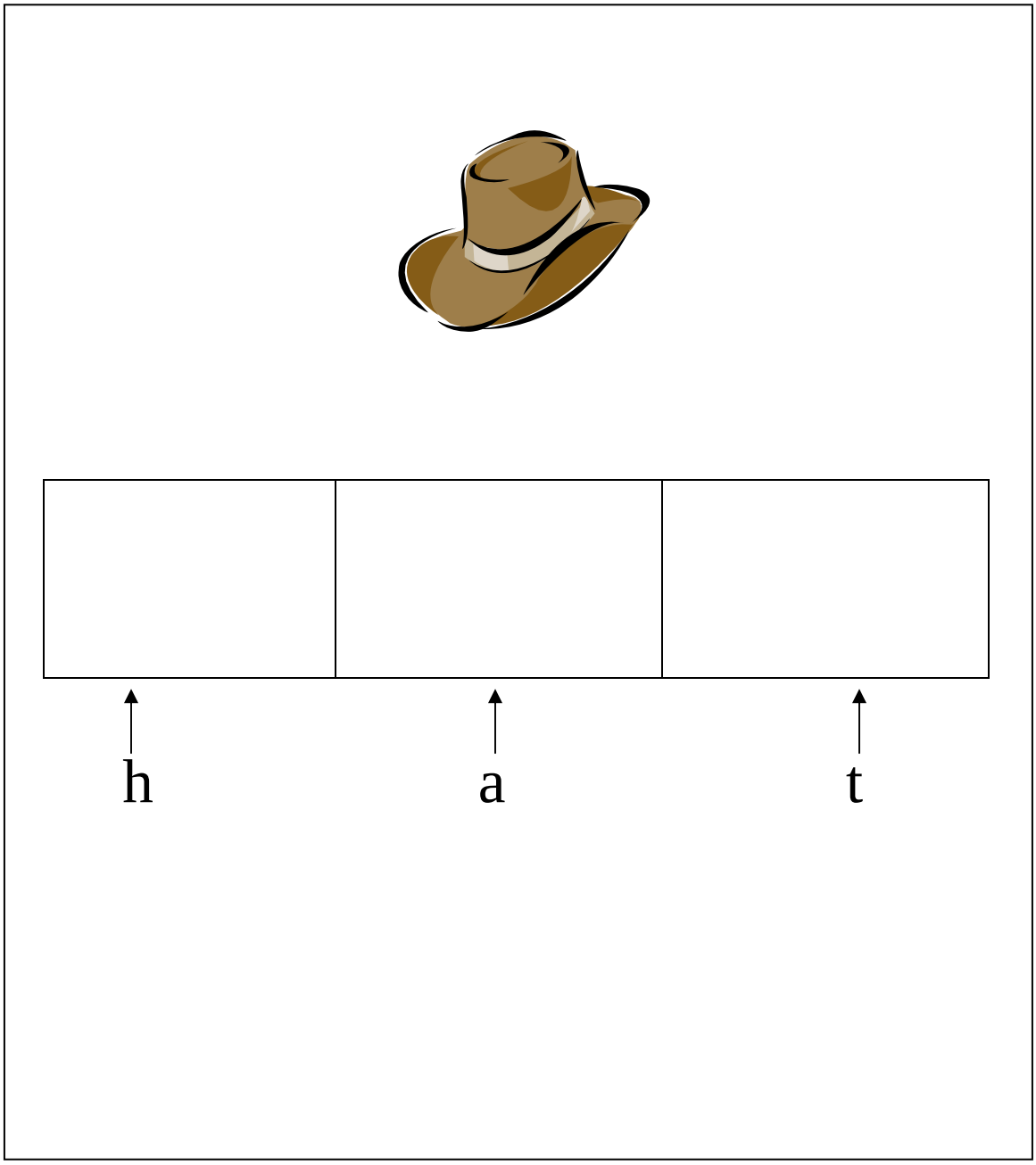

Figure 3. Example of a Word Box Worksheet.

Joseph (1999) examined the use of word boxes with children who have a variety of disabilities. Three second-grade boys, two third-grade boys, and one fourth-grade boy were selected for a total of six students for the study. Regardless of disability type, all

students demonstrated significant delays in phonemic awareness. Results from the Test of Phonological Awareness indicated that the boys had not mastered the skill of detecting differences and similarities among phonemes within words. They exhibited difficulties with single-syllable words, such as CVC (hat, sit) words and CCVC (what, this) word types. The subjects' resource room instruction consisted of storybook reading, drill and practice activities, reading word lists, and writing weekly spelling words 10 times each. Minimal instruction was given in teaching phonological or orthographic spelling process.

The intervention procedure consisted of 10 words that were typed in a large font size on individual white paper. Magnetic boards and colored markers were used to draw the divided boxes, along with tokens (for reinforcement), magnetic letters, and colored markers. Instruction consisted of 20-minute daily lessons over 21 sessions. Each student was given a demonstration of how to use the word boxes. For instance, the magnetic letters were moved into their correct part of the word box as each sound was made for that particular word. The letters were then orally presented and students were to write the letters in the boxes as they heard each individual sound in a word. A multiple baseline design across subjects was used in order to ensure changes in performance were due to instructional differences. Before the word boxes instruction strategy was implemented, spelling measures were used to obtain students baseline levels by spelling CVC and CCVC patterned words. The researcher maintained control by having other students remain at baseline until the first subject demonstrated progress on both word identification and spelling performance on daily quizzes. Scores were calculated for baseline, instruction, maintenance and transfer phases. Results indicate that the word box strategy was effective for improving and maintaining all students' word identification (9

out of 10 correct with a mean of five trials) and spelling skills (9 out of 10 correct with a mean of six trials). Through informal observations, students were found to eventually subvocalize (whisper) the sounds in a word before reading or spelling the word. This subvocalization leads to students being able to spell words to automaticity.

The author suggests incorporating word boxes into instructional time, during storybook reading, writing activities and even independent work. They are an effective instructional strategy that reinforces phonological and orthographical awareness in students with a range of disabilities.

For older students, self-management techniques may be a useful tool for improving the academic performance of students with mild to moderate learning disabilities. It is well documented that when students with LD study independently, they frequently use ineffective study methods (Graham & Freeman, 1985). Teachers should provide effective instruction when teaching students a technique for learning their spelling words and encourage them to use these methods.

One technique that has been used is the “cover, copy, and compare” method. The cover, copy and compare strategy requires the student to follow these steps: look at the written word; cover the word; write the word, uncover and check the word. If the student misspelled the word, they are to repeat the procedure three times before going on to the next new word.

Wirtz and Gardner (1996) examined the effects of this self-correction procedure on the spelling performance of six low-achieving regular education students. Three boys and three girls were recommended by their general education teacher for the study. Their ages ranged from eight- to ten-years-old and had only earned a letter grade of C or lower

in spelling. The independent variables in this study were two spelling strategies: a traditional approach and self-correction methods. The traditional method included writing the target words three times each, arranging them in alphabetical order, using them in a story and then using each one in a sentence. If the task was completed before the lesson was over, they were instructed to repeat the instructional activity. For the self-correction method, students were to utilize proofreading marks to correct their own spelling errors. The students were given a correct list of spelling words and given an audiotape of the same words. Each word on the spelling list was read by the teacher, used in a sentence, and then stated again. The students were then instructed to implement the cover, copy, compare strategy.

The results indicated that the self-correction strategy produced positive effects for the self-correction method. For instance, student 1 improved from 65% to 83% correct, students two, three and four were respectively spelling only 33% of their words correctly, but improved to at least 65% accuracy using the self-correction technique. Students five and six also improved greatly from the baseline of 60% correct to 88% and 93% correct. When a generalization probe was administered, 28 words were spelled correctly from the traditional condition compared to 43 correctly spelled words from the self-correction method. The self-correction procedure allowed for immediate, clear, and specific feedback, which could be considered superior to the traditional method since errors could go undetected and be practiced throughout an entire lesson. This strategy also allows for individual instruction that can accommodate any spelling level.

Spelling Performance of Students with Mild Learning and Behavior Problems

Word identification can be defined as the number of words an individual can correctly pronounce or write when reading from a list of words (Carver, 2003). Word identification can also include other components such as pseudoword decoding, reading level and spelling achievement. Many researchers in the past have documented the phonological impairments in all types of children who experience problems with learning to read and spell (Metsala, Brown, & Stanovich, 1998; Pennington, 1991).

Ackerman and Dykman (1996) focused their study on the speed response of adolescents with LD in the domains of handwriting, coding, letter naming, simple text reading and spelling. Ninety-three of the subjects with LD were found to have the speed measure significantly related to their word identification scores. Students who performed poorly on decoding were also found to be poor word list readers and spellers. The authors discuss the possibility that students with poor word list reading and spelling likely stems from slow processing, retrieval, and execution of their phonological ability.

When young students start their academic careers with slow processing speed and poor decoding, they will continue to struggle and cannot rely on the immersion into content areas to increase spelling awareness. Morris and Perney (2003) examined the ability of 102 kindergartener's reading skills to predict later reading achievement (general and special education students). The prereading skills of the children were assessed at the beginning, middle, and end of kindergarten. Reading achievement scores were then taken at the end of first and second grade. Students were assessed in alphabet recognition, beginning consonant awareness, spelling with beginning and ending consonants, phoneme segmentation, and word recognition. A step-wise linear regression was used to

determine which variable best predicted first- and second-grade achievement. All three assessments during kindergarten yielded alphabet recognition and spelling as the best predictor of first grade passage reading (R = .77). The best predictor of second-grade passage reading was end of first-grade passage reading (R = .78). Overall, the set of prereading skills administered in kindergarten was effective at predicting reading scores at the end of first- and second-grade. A comprehensive reading approach should include components such as spelling, phonemic awareness and word recognition in early literacy programs in order to improve the reading achievement of young students regardless of their current achievement level.

MacDonald and Cornwall (1995) were also interested in the relationship between phonological awareness in reading and spelling achievement. Their study goes beyond the aforementioned study and focuses on assessing a group of 58 kindergarteners and then assessing them again at the end of their twelfth-grade year. Only 24 out of the 58 original students were still in the same school district and had agreed to participate in the eleven-year follow-up study. The subjects were 13 girls and 11 boys with a mean age of 17.04. The students were given the AAT, Peabody Picture Vocabulary Test-Revised; Reading subtest of the Wide Range Achievement Test-Revised; Spelling subtest of the WRAT-R and the Passage Comprehension Subtest of the WRMT-R. The battery of tests yielded the WRAT-R Reading and Spelling scores were highly intercorrelated and both highly correlated with the WRMT-R Word Attack scores (R = .61). There was also evidence that phonological awareness, as measured by the AAT, was a concurrent and long term predictor of word identification and spelling skills for students in kindergarten and later in the twelfth-grade (R = .53). The importance of phonological awareness and

spelling at an early age can be a useful tool in designing effective spelling programs in order to decrease the number of students who fall further behind academically every year.

Regardless of ability level, spelling continues to be a more difficult task than reading for students with mild learning and behavior problems (Mastropieri & Scruggs, 1987; Nelson, 1980). Spelling requires the production of exact letter sequencing, letter sounds knowledge, an indepth understanding of grapheme-phoneme relationships and, unlike reading, cannot rely on contextual clues for spelling accuracy.

Studies on Children's Descriptions About How They Spell

Little attention has been paid to reporting on how children describe their spelling. Research on the cognitive processes children implement when spelling is also limited (Griffith, 1991; Treiman, 1993). Steffler, Varnhage, Firesen and Treiman (1998) attempted to understand the cognitive processes children use to spell. Their study included 93 children in second through fifth grade. The children's verbal report on how they spelled was coded into five categories: (a) retrieval, (b) phonetic, (c) explicit rule, (d) analogy, and (e) other. When children said they "knew" how to spell a word they were coded as retrieval. When they reported, "sounding it out" it was coded as a phonetic strategy. When the children compared the word to another known word it was coded as an analogy strategy. When they stated an orthographic rule or strategy, it was coded as a rule strategy. The word types CCVC, CVCC, and CVCe were given to each grade level in order to run a one-way ANOVA for each word type.

The authors found the responses coded as retrieval yielded a higher percentage of correctly spelled words than the phonetic strategy for all word types F (1,53) = 12.59, F (1,60) = 9.07, and F (1,56) = 12.55, $p < .05$, for CCVC, CVCC, and CVCe word types).

Children in the second grade were less successful than children in the older grades when using the retrieval strategy to spell. For all grade levels, CCVC words also appeared to be easier to sound out than CVCC words. There was no grade effect for rule use with CVCe words. Children at all grade levels were successful in applying a specific rule to spell words. Results also indicated that the explicit rule strategy was more effective than a phonetic strategy in the second-grade group.

These results support the theory that children can provide reasonable and accurate reports of how they spell. Future studies should encourage teachers to ask children how they spell a word rather than draw inferences from their spelling errors. Their strategy for spelling provides valuable insight into their cognitive processes. With this information, instruction can be provided to specifically remediate spelling errors. For instance, a child who spells *take* as *taek* may know the final e rule, but not know how to apply it correctly. Thus, the remediation would be in teaching the final e rule. Teachers need to know how children spell in order to help guide them in choosing the appropriate strategy for spelling new words.

More specifically, Weiner (1994) compared the spelling descriptors of four poor and four good spellers. Two teachers were selected for the study because their classrooms had contrasting instructional views of spelling. Teacher one provided a direct instruction approach to teaching. Teacher two taught a more comprehensive view, by including spelling as an integral part of her reading and writing lessons. One good speller and one poor speller were chosen from each classroom, making a total of four students for the study. Good and poor spellers were defined by teacher recommendation and scored above or below average on the Gates-MacGinite Reading Test.

Unstructured interviews revealed that poor spellers were less likely to take risks in spelling, were slower (automaticity), and did not easily transfer knowledge. One student was described as saying, "I ask the teacher what they are and how to spell them." This cautionary attitude may limit some students in transferring knowledge into other spelling words. Another student described how she "just knows" a word: "… you learn it from school or at home or something, and then you get time to get the word stuck in your mind. It's just like bubblegum; it just sticks on your face when you blow bubbles" (p. 325). Poor spellers relied heavily on sound/symbol knowledge while good spellers were more likely to use symbol knowledge and within-word patterns strategies (i before e rule). Children's thoughts about spelling are critical features in understanding and designing effective spelling instruction for good and poor spellers.

Since students with LD have problems with spelling more so than their normally achieving peers, it is important to identify the strategies they use when attempting to spell words. Darch, Kim, Johnson, and James (2000) investigated the strategic spelling skills of students with LD. The purpose of their study was two-fold: (a) to identify the strategies students with LD use when spelling, and (b) to compare the effectiveness of two spelling programs. Four second-grade students with LD (age = 8.6) were the subjects for examining spelling strategies.

The structured interviews revealed four major categories of spelling descriptions: (1) rule-based, (2) multiple, (3) resource-based, and (4) brute force. Rule-based strategies consisted of students who applied the correct rule when spelling. The multiple strategy was when students used more than one strategy during spelling. A resource-based

strategy indicated the use of a prior learning experience. A brute force response was when students used a less sophisticated strategy to spell.

Results from the interviews revealed that students almost exclusively used a brute force strategy. An example student comment would be: “I keep on trying. I keep thinking about the word. Sometimes I guess if I don’t know. I just spelled it and did the best I could” (p. 20). Students who used the brute force strategy usually showed high levels of frustration when trying to spell. When students were asked to describe how their teacher taught them spelling, they had poor descriptions of instruction and failed to recall any details. This suggests that students need to be taught specific spelling strategies with intensive instruction and to learn when and how to apply those strategies.

The two spelling programs evaluated consisted of the *Spelling Mastery* Program (Dixon & Englemann, 1990), a direct instruction program, and the Laidlaw Spelling Program (Roser, 1987), a basal program. Thirty students with LD were selected to determine the effectiveness of the two different spelling programs. The three probe tests (once a week) and the posttest favored the *Spelling Mastery* group. The range of percent correct on probe one was 87% ranging to 70% on probe three. The Laidlaw Spelling group performed statistically significantly lower on each of the three probes ($p < .01$). In the posttest measures, the *Spelling Mastery* group earned a 73% correct outperforming the Laidlaw Program with only 53% correct. Students taught with the rule-based program were more likely to become proficient spellers when presented with previously taught word types. The purpose of coupling both experiments was to provide information regarding students’ use of strategy as well as insight into curriculum design for spelling

instruction. Programs that implement skill and strategy training with corrections, feedback, and practice to mastery are most effective for children with LD.

Children's Thoughts About Their Spelling

Current research on general and special education spelling achievement concentrates on either the various abilities among the groups, or the success of different kinds of instruction. Little attention has been paid to how children think about spelling. Downing, DeStefano, Rich and Bell (1984) studied the spelling beliefs of a group of 122 children in grades one through six. Their findings suggested a drop in spelling self-efficacy as children progress through grades. They found that three out of four first graders thought they were good spellers but at grade three and beyond, this feeling dropped to less than half of the students studied. Students at all grade levels responded to whether or not they were good spellers solely by their weekly test grades.

Licht, Kistner, Ozkaragoz, Shapiro and Clausen (1985) wanted to determine whether children with LD were more likely to attribute their failure to lack of ability or to external factors (factors beyond their control). Since most students with mild to moderate learning disabilities have experienced repeated academic failure, these incidences may lead the student to believe that they do not have the ability to succeed. These beliefs are expected to lead them to give up more easily on an assignment than their regular achieving peers. Thirty-eight children with LD and 38 regular education elementary students were selected for their study. It was found that children with LD were significantly less likely to attribute their failures to insufficient effort. Moreover, the girls with LD were more likely than non LD girls to attribute their failures to insufficient ability; boys in general were more likely to blame external factors for their failure. These

findings support the assumption that beliefs about oneself as a speller may affect spelling performance.

Rankin, Bruning and Timme (1994) examined the relationship between spelling performance and students' beliefs about spelling, including self-efficacy and outcome expectancy for students in grades four through seven. Their findings support previous research about low self-efficacy and its relationship to poor spelling performance. The outcomes that students expect rely heavily on their judgment of how well they will be able to perform a given task. Since individuals usually see outcomes as depending on their performance, and because they care about their outcomes, they will rely on self-efficacy to determine what to do and how much effort to expand to an academic task. The students in the fourth-grade group reported spelling performance attributed to both their effort and ability, while the seventh-grade group stressed their effort as more of a predictor of their performance. The authors suggested that spelling programs focus on strategically building students' confidence since there seems to be a reciprocal relationship between their thoughts about spelling and spelling performance. In order for a student to believe that effort will improve their spelling, teachers need to provide students with tasks that they know they will succeed in order for them to believe that they can be successful.

Current Classroom Spelling Practices

Studies have indicated that classroom instruction usually does not take into consideration the wide range of spelling abilities (Graham & Voth, 1990). The traditional spelling curriculum emphasizes pupils learning to spell a specific set of weekly words

through memorization. In most cases, students do well on a weekly test, but when one examines transfer knowledge and retention, students tend to do poorly. Current practices emphasize the idea of memorizing spelling words, rather than teaching students rules and strategies (Sangston, 1993).

Expected student spelling knowledge can be described linearly through grade levels. During the elementary school years, students discover and examine what they know about sight words. They are typically taught basic alphabetic sounds, long and short vowel sounds, patterns, digraphs, and blends. Word lists during these years consist of five or six words working up to 12 words during third grade. In the upper grades, spelling focuses on discriminating among syllable patterns and awareness of relationships in words (Templeton, 1983). Aspects such as the way affixes, prefixes, and base words combine to create words and represent meaning. As they get older, students are expected to apply advanced spelling strategies when combing different forms of etymology. Words from Greek and Latin origins are also introduced to move students into more efficient and effective readers and writers.

Traditionally, teachers try to teach these word types through a variety of instructional methods. Even though spelling books have been in the classroom for decades, spelling instruction has been deemphasized as a minor component of the writing process. Some view it as a language skill to be taught incidentally as children are immersed into content (Morris, Blanton, & Blanton, 1995). Thus, teachers use older programs or methods for teaching spelling, even though they may not be the most effective.

For those who do not use a basal speller, a lesson typically includes 10-15 minutes a day of instruction. Words to be studied are given in a list form. Children are usually given a pretest to determine which words are to be studied throughout the week for their Friday test. Some children are taught a specific strategy for teaching themselves unknown words. Overall, a large portion of spelling instruction is devoted to ineffective activities. There are three general strategies described in the literature as being used in the classroom.

The first strategy is the cover-copy-cover method. Students look at the word as they say it, cover the word, write the word, compare the word to the correct spelling, and if wrong, repeat the previous steps (Johnson, Langford & Quorn, 1981; Opitz & Cooper, 1993).

The second strategy is an independent strategy used mostly when students in a class are of various academic levels. This strategy includes receiving a spelling list on Monday. Throughout the rest of the week, students are supposed to write the words ten times each, put them in alphabetic order, place them in a sentence, and construct a story using all the words. By Friday, students should have grasped the spelling of these words, know what they mean, and have been creative and placed them in a story, thus having prepared students to do well on their test.

The analogy strategy is the third widely used method. Englert, Hiebert and Stewart (1985) describe the analogy strategy as selecting rhyming words along with a strategy rule. The rule is taught as: “when two words rhyme, the last part of each word is usually spelled the same.” The examples are then listed on the board to illustrate the rule (i.e., make, bake, rake, fake, take). Students are asked to find the word on the board that

rhymes with an orally presented word. Students are then asked to identify each letter that the words share and to spell an unknown word using the repeated letters of the target words. These three typically used strategies may work for some students but can be difficult for students with mild learning and behavior problems, especially if these students have one or more deficits in previously mentioned areas. Other similar methods are described in Figure 4.

Spelling Word Study Procedures

Kinesthetic Method (Graham & Freeman, 1986)

1. Say the word.
2. Write and say the word.
3. Check the word and correct if needed.
4. Trace and say the word.
5. Write the word from memory, check it, and correct if needed.
6. Repeat steps 1-5.

Copy-Cover-Compare (Murphy et al., 1990)

1. Examine the spelling of the word closely.
2. Copy the word.
3. Cover the word and write from memory.
4. Check the word and correct if needed.
5. If spelled correctly, go to next word.
6. If spelled incorrectly, repeat steps 1-4.

Connections Approach (Berninger et al., 1998)

1. Teacher says word, points to each letter, and names it.
2. Child names word and letters.
3. Child shown a copy of the word with the onset and rime printed in different colors.
4. Teacher says the sound and simultaneously points to the onset and rime in order.
5. Child looks at, points to, and says the sound of the onset and rime in order.

Figure 4. A List of Commonly Used Spelling Techniques

Note. From "Handwriting and spelling instruction for students with learning disabilities: A review," by S. Graham, 1999, *Learning Disability Quarterly, 22*, p. 88. Copyright 1999 by PRO-ED. Adapted with permission.

Fresch (2003) sent out a national survey of spelling instruction. She wanted to investigate teachers' beliefs and practices in spelling. Ninety-eight percent of the 355 teachers surveyed from around the country reported spending specific time each week for spelling and 73% believed that formal spelling instruction was needed for students to achieve. The majority of the teachers reported using practices that resemble the basal speller, 72% reported using a common list for the entire class. Fifty-six percent of the teachers reported using mini-lessons, 20% used small group instruction, and 11% used one-on-one instruction. They usually reported using practice sheets, spelling games, word sorts and word walls. A large number (84%) used a weekly posttest for grades. Overall, the author found these practices to be conventional, resembling the traditional basal speller format.

The survey concluded with an open-ended question allowing teachers to respond to any other issue of concern as it related to spelling and their teaching. Most teachers responded that they were very concerned about meeting the individual needs of their students. Those who used the basal speller admitted it was not the best tool to use, but were doing so out of convenience. Some teachers felt restricted by their school districts because their basal spellers were chosen for them.

The author reported that this question elicited more than personal descriptions of instruction. Twenty-three percent described larger professional issues that bothered them. Statements included: “We have watered down curriculum standards and dumbed down long enough. I teach students from a low-income neighborhood. I have high standards for them and they are learning.” Another teacher replied, “I feel a lack of consistency in spelling instruction is largely responsible for our nation’s weak spelling, as is spell check” (p.834). One teacher remarked, “I would love to have a more standardized list that students at second grade would be required to master. Also, I don’t feel I have ever been given any direct instruction in effective techniques to teach spelling for student mastery and use” (p. 835). Even though teachers are not enthusiastic about using their basal, a high percentage of those teachers still rely on them on a daily basis. Figure 5 provides a current table of instructional materials, basal series, word lists, and materials being used.

		Percent Reported
Purchased program	Basal speller	62
	Purchased word list	34
	Both basal and purchased list	27
	Neither used	28
Program selected by	District curriculum committee	44
	Building curriculum committee	16
	Grade level decision	11
	Each teacher selects own program	17

(table continues)

		Percent Reported
Basal spelling series used	Houghton Mifflin	14
	Macmillan/McGraw Hill	9
	Scott Foresman	6
	Harcourt Brace	6
	Rebecca Sitton	5
	Scholastic Literacy Place	3
	Others listed < 1% each	19
Word lists used	Teacher created	6
	Rebecca Sitton	5
	High frequency (Dolch)	4
	MacMillan/McGraw Hill	3
	Harcourt Brace	2
	Other listed < 1% each	14
Source of word lists	Basal speller	44
	Purchased word list	14
	Teacher selection	22
	Student selection	< 1
Source of words studied	Spelling pattern	66
	Grade level word	58
	Curricular words	33
	Student suggestions	7
	Student writings	17

Figure 5. Teachers Reported Use and Selection of Spelling Programs

Note. From "A national survey of spelling instruction: Investigating teachers' beliefs and practice," by M. Fresch, 2003, *Journal of Literacy Research, 35*, p. 843. Copyright 2000 by Journal of Literacy Research. Adapted with permission.

Summary of Descriptive Studies

The studies reviewed in this section describe a number of conditions that make spelling difficult for students with mild learning and behavior problems. Low-achieving students and students at-risk for failure also encounter many of these problems. A number of studies supported the expected academic differences between students with special needs and their normally achieving peers. Overall, the comparisons of academic performance indicate that students with mild leaning and behavior problems fail to accomplish the same level of achievement as their normally achieving peers. Findings also support the theory that young students who start out as poor spellers continue to do so late into their academic careers.

Studies describing attention difficulties, poor memory, lack of sequencing skills, self-concept, and anxiety document characteristic differences among good and poor spellers. Also, interviews reveal that students with mild learning and behavior problems tend to feel that academic failure was due to circumstances beyond their control. Furthermore, these students rarely report using any sort of strategy when spelling a word, and typically fail to generalize their new spelling skill regardless of age. The tendency has been for these students to apply an inappropriate spelling rule or strategy when faced with an unknown word.

Teachers report relying heavily on a traditional spelling instruction model, since they conveniently provide grade level word lists. Although the strategies reported vary slightly, all of them depend on students being able to memorize a word's spelling.

Intervention Studies

The purpose of this section is to review recently published empirical research on spelling instruction for students with mild learning and behavior problems. This review will allow for a discussion on the implications for classroom practices and future research. In this section of the paper, 34 studies will be reviewed. All studies of the investigation had dates between 1985 and 2005. Approaches to instruction for spelling were examined under three broad headings: (1) computer-aided methods, (2) interventions that implement a specific spelling strategy, and (3) interventions that include explicit and systematic instruction.

The next section will provide a thorough discussion on interventions using packaged spelling programs. These packages contain a series of components that are better analyzed as a whole than by individual parts. This section will also allow for an examination of major programmatic differences and its effectiveness on students with mild learning and behavior problems.

Computer-Aided Approaches

Many students with learning and behavior problems are able to compensate for some academic deficits, but often retain their spelling deficits well into their adult lives (Leuenberger & Morris, 1990). Some researchers argue that instruction should include remedial instruction, but also incorporate compensation skills, such as utilizing a spell checker program. Montgomery, Karlan and Coutinho (2001) investigated the effectiveness of spell check programs to determine how they differ in producing the desired target word in the first position of choice. Out of the six programs examined,

none of the programs were found to be effective in providing the target word in the first list of spelling suggestions. An effective spell checker would be one that provided the target word in the first replacement list. Spell checkers provided the correct word within the top ten-list of suggestions only 76% of the time. Unfortunately, this percent increases as the word progresses with complex phoneme-grapheme relationships and use of irregular words. Furthermore, spell checkers cannot eliminate written expression deficits of many students. For example, typing “red” for “read” or “this” for “that.” MacArthur, Graham, Haynes, and DeLaPaz (1996) found that even with the addition of spell checkers, student with disabilities identified only 63% of their errors.

Research in the area of instructional software for spelling has been limited. Over the last few years though, a body of computer-assisted instruction (CAI) has emerged. For instance, McAuley and McLaughlin (1992) wanted to compare the effectiveness of two spelling techniques on the weekly spelling tests of five at-risk elementary students. The techniques were the traditional Add-A-Word technique (Cover-Copy-Compare) to the computerized Compu Spell program (Peachtree Software, 1990). Baseline consisted of the traditional spelling method already being used in the subjects’ classroom. The results of their study indicated that the Add-A-Word technique and Compu Spell programs produced higher spelling accuracy when combined together than the traditional spelling procedures used in the baseline. Some might argue that this improvement is due to the fact that students were given more opportunity to practice their spelling words and differences may not be due to the effectiveness of the computer spelling program. These results might also be difficult to generalize because of the small sample size (n = 5).

Cunningham and Stanovich (1990) researched which mode of response (writing, typing, or using tiles to spell words) lead to better spelling performance of twenty-four first grade children. They found that the motor activity of writing was statistically significant over typing or tile manipulation (F (2, 46) = 8.48, $p < .001$). The authors suggested using computers as a supplemental tool to teaching spelling. The computer can be a motivational tool that encourages students to practice with more unknown letters and words.

Berninger et al. (1998) took the previous study a step further and wanted to determine whether the use of pencil writing was more effective than the computer when applied to children with both handwriting and spelling disabilities. The children in this study (mean age = 86.21) had a spelling disability or a handwriting and spelling disability. The 24 children in the study were randomly assigned to a pencil or computer response mode. Forty-eight words of varying difficulty were taught using a method that emphasized hearing the word and seeing the word to make the connection between the phonological and orthographic representation of the words being taught. Overall, this study replicated the findings of the Cunningham and Stanovich (1990) study that revealed the computer keyboard offered no superiority to writing as a response mode for learning to spell words. The authors suggested that this may be due to the redundancy and repetition of letter production and attending to sound-spelling correspondence when in the act of writing. As suggested by previous researchers, children with mild learning and behavior problems may benefit from instruction in spelling while integrating the computer for other academic activities (Cunningham & Stanovich, 1990; McAuley & McLaughlin, 1992; Torgerson & Elbourne, 2002).

Daal and Leij (1992) examined the effects of students who were taught to read from the computer, copy from the computer screen, or write a word after it was removed from the computer screen. The authors found that the nine third-graders with LD made significantly fewer errors when copying the words from the screen. They suggest that students should master phoneme-grapheme relationships before moving onto words that are more difficult. Future programs should use speech feedback provided simultaneously with the typed word.

Lastly, it should be noted that the inability to spell correctly inhibits the effective use of spelling correctly whether using technology (the computer) or a standard dictionary. Montgomery and Mastropieri (1996) found that the use of spell checkers by college students with learning disabilities did not always provide the target word for their misspellings. In other words, they knew the word was spelled wrong but had no way of figuring out the correct spelling. The subjects of their study had developed compensation techniques that were time-consuming, and frequently unsuccessful. Their only successful strategy involved seeking assistance from others.

Overall, computerized spelling programs do not seem to be effective in teaching children to spell. Practical considerations for utilizing a computerized program include the number of computers available in an individual classroom versus the number of students in that classroom. The high cost of commercial software and teacher time necessary to implement these programs should also be considered. Most studies reported that students who use a CAI program have higher rates of students being on-task during practice activities (Mushinski-Fulk & Stormont-Spurgin, 1995). Although it is good for students to be on-task, this may not be academically effective if the instructional

approach of the computer program is not teaching the skills necessary to spell well. However, the computer can be used as a motivational tool that is a supplement to spelling instruction. The idea of using technology to teach spelling is still a novel research area. Further research should focus beyond how much students enjoy CAI and are engaged in the programs, but seriously examine the effectiveness (transfer and generalization knowledge) of these rapidly produced programs.

Spelling Strategies

The following spelling interventions include a change in at least one instructional variable to examine its effectiveness on students' spelling performance. These spelling strategies or techniques for students with mild learning and behavior problems include: (a) examining explicit instructional techniques, (b) teaching rule-based strategies, (c) employing student lead techniques, (d) presenting analogy strategies, (e) implementing word boxes and word sorts, and (f) teaching at a student's instructional level.

Some researchers claim that words are spelled through the use of visual-recognition acquired by reading (Simon & Simon, 1973). Thompson and Block (1990) examined this theory through different formats for spelling practice using two-multiple choice (recognition) conditions and one production (recall) condition. The subjects were 120 fifth- and sixth- grade students from an elementary school. These groups were defined by the spelling subtest of the SAT to identify high- and low-ability spellers. The median range of scores among the students served as the divider for high- and low-ability groups. Six groups were formed with a combination of the high- and low-ability students within each group; one group served as the control group. To determine whether the training procedures enabled students to learn to spell, the training groups were compared

to the control group. Groups were taught 15 words, for three or six trials. The effects of variation on practice formats, number of trials and ability were assessed by an immediate and delayed "generate-and-test" procedure. A post hoc analysis indicated that all groups produced significantly more ($p < .01$) correct spelling than the control group. However, no group demonstrated a higher percent correct. Overall, the data show that students can learn to spell from recognizing the correct spelling when given two word choices. Furthermore, the recall format in which students must analyze the spoken word and convert it to graphemes and phonemes, and produce a correct spelling led to greater learning and retention.

These results may be due to traditional spelling instruction emphasizing students to "generate" words through their memory of other similarly spelled words. The authors note that an instructional task that elicits both sounds and letter combinations promote spelling. Students should be taught to decode (not just memorize) their spelling words. In addition, this study did not report amount of practice (three vs. six trials) students were given. Also, students were tested on their words shortly after learning them and could have utilized their short term memory when asked to spell words.

Darch and Simpson (1990) examined the effectiveness of teaching students with LD to spell through the use of visual imagery mnemonic or rule-based strategies. This study takes a more in-depth look designed to evaluate the effectiveness of two highly dissimilar approaches to spelling instruction. Twenty-eight upper elementary students were randomly assigned to two groups during a four-week summer enrichment program. Students were tested on three dependant measures: (a) three 10-item unit tests

administered every eight to ten lessons, (b) a 25-item posttest of randomly selected words, and (c) the Test of Written Spelling-3 (TWS-3) at the conclusion of the study.

The spelling rule-based groups were taught three strategies: a) morphemic analysis, b) phonemic analysis, and c) spelling rules. Students were also provided with specific teacher corrections during instruction. The visual imagery group was provided with a generic visual imagery framework that could be applied to all word types. These students did not receive corrections to their work like the rule-based group.

Overall results of the study indicated that students taught with an explicit rule-based strategy approach outperformed students who were taught with the visual imagery strategy. A comparison between the three dependant variables indicated that the students who were taught in the rule-based strategy performed around 75% correct on their spelling words. With the visual imagery group scoring in the 50% correct range. These results may be due to guided practice provided to the students. Students in the visual imagery group may have performed poorly because the teacher could not be sure whether the students were using the imagery model when practicing their words. In contrast, the students in the rule-based strategy group were systematically taught to apply spelling rules in an observable manner. This allowed for close teacher monitoring and immediate corrective feedback when an error was made.

Kearney and Drabman (1993) took the previous study one step further by evaluating the effectiveness of the write-say method while providing immediate feedback to dual sensory modalities (visual and auditory). This study included four males and three females around the age of 12 with a learning disability. All displayed average levels of intelligence but performed at least two years below grade level in reading. The write-say

method had been used in previous studies to teach multiplication facts. In this study, the write-say method was adapted for teaching students to spell. The students were given a word and instructed to rewrite the word five times each, say the word aloud, and correct their verbal mistakes.

The intervention procedures were introduced on a multiple baseline design across three groups of subjects. Mean spelling accuracy for the three groups during baseline ranged from 72.5% to 45.9%. Experimental phase percentages yielded a range of 90.0% to 71.7%, respectively. During the last week, the students' percent correct improved even more, up to around 80.0% and 95.0%, respectively. Overall, the subjects improved an average of 34.9% from baseline. The intervention of using the write-say method produced statistically significant results in the spelling accuracy of the students with learning disabilities. The results of this study support previous research on the efficacy of designing instruction that includes immediate feedback to dual sensory modalities (i.e., visual and auditory). It is important to identify a student's sensory strength, so that instruction may compensate for another sensory weakness in order to be a successful speller.

The small sample size (n = 9) makes it difficult to generalize the results of this study to an average size classroom. This study did not use any type of formal generalization assessment. Therefore, it cannot be determined whether or not students would use the student-lead method (write-say method) on their own. Since, as previously noted, when students with disabilities are left alone, lack effective strategies or misuse strategies, for spelling known and unknown words.

A similar study by Wirtz, Gardner, Weber, and Bullara (1996) focused on another student lead intervention of using self-correction to improve spelling performance. This study also included a generalization probe that is necessary to assess the students' abilities to transfer their new skill to a novel situation.

More specifically, this study compared the effectiveness of two spelling strategies (traditional vs. self-correction) on the spelling performance of six low-achieving third-grade students. The traditional method was defined as an instructional strategy in which students are engaged in different instructional activities for a period of time. The self-correction method consisted of an instructional strategy in which students used proofreading marks to correct their own spelling errors. The teacher correctly wrote each of their words correctly in a column. The spelling words were also presented on audiotape in which words were spoken, used in a sentence, and then stated again. Students were instructed to write each spelling word, and then compare each word to the model list. If any words were misspelled, students wrote the word correctly, and then began the task again. Students were given a pretest, weekly tests, biweekly tests, and a generalization probe at the end of the ten-week study.

All students performed significantly better when taught the self-correction method on all dependent measures. Results indicate that on average, the students learned 7.5 words per week during the traditional method and 11.5 words per week in the self-correction method. More importantly though, students were able to accurately spell more words learned in the self-correction method than in the traditional method on the generalization probe. The students spelled 28 words correctly from the traditional method compared to 43 words spelled correctly from the self-correction method. Not only were

more words learned in the self-correction method, but more of those words were spelled correctly on the biweekly maintenance tests.

Students not only must learn how to spell words, but should maintain the ability to spell the words correctly over time, and be able to use the words functionally (generalization). The self-correction method can allow a teacher to individualize spelling instruction without affecting the teacher's availability to other students. The opportunity for immediate corrective feedback allowed in the self-correction method is better than the more delayed feedback in the traditional method.

Beyond the self-correction method, students require the mastery of a strategy in order to read and spell unknown words (Gibson & Levin, 1976). Other studies of older subjects show that mature spellers generate novel words through the use of analogy strategies (Hodges, 1982; Juola, Schadler, Chabot, & McCaughey, 1987; Lewis, 1983). For instance if a student knows *–ack* in *back*, then they should be able to read *track*. Analogy strategies can also focus students' attention on similar endings that words share (words such as *can, fan, tan* and *pan*). This type of instruction typically helps students identify and memorize words that make up a number of word families (Brown, Sinatra, & Wagstaff, 1996).

The effects of instructing students to spell new words by using spelling patterns from known words was investigated by Englert, Hiebert and Stewart (1985). Students were taught to memorize the rule that "When words rhyme, the last parts are often spelled the same." This involved students memorizing the rule and then given a demonstration of the rule by the teacher. Students were then taught the strategy to generalize their new words by finding: (a) the printed word in a spelling bank that rhymed with the auditorally

presented word, (b) identifying the portion in both words that rhymed and was spelled the same, and (c) spelling the new word using the rhyming elements of the spelling bank word. Training consisted of using direct-instruction procedures, specifically the model-lead-test format (Carnine & Silbert, 1979).

Twenty-two students with a learning disability or mild educable mental retardation who were enrolled in a resource room were randomly assigned to the experimental or control groups. Overall, results on the posttest indicated that the experimental group spelled significantly more common, $F(1,21) = 11.26$, $p < .01$, and uncommon transfer words, $F(1,21) = 4.91$, $p < .05$, correctly than the control group. Therefore, teaching the analogy strategy positively influenced the students' acquisition of spelling known and unknown words. The gains made by the experimental group underscore the importance of the direct training of generalizing strategies for the spelling of novel words.

This evidence indicates that students who cannot identify words quickly and effortlessly encounter ongoing difficulty understanding what they read because they expend their cognitive abilities on decoding rather than comprehension (Brown, Sinatra, & Wagstaff, 1996; Stanovich, 1986). Thus, explicit analogy instruction has a positive effect on the spelling performance of students with disabilities.

For students with more severe disabilities, other strategies may be more appropriate. The use of word boxes and word sorts are also two approaches that involve teaching phonemic awareness, making letter-sound correspondences, while teaching spelling through the use of explicit instruction. These techniques incorporate spelling and

phonemic awareness training by using concrete manipulative materials (Pressley, 1998; Stahl, 1998).

Few studies have examined the effects of these approaches in isolation with a sample of children identified as students with disabilities. Moreover, there have been no studies that have examined the effectiveness of these techniques with a sample of students with mental retardation (Joseph, 2002). This lack of research caused Joseph (2002) to conduct a small study of three students with mental retardation. Two females and one male with an average age of ten years and two months participated. The purpose for this study was to examine the effectiveness of combining word boxes and word sort instruction on the spelling performance of students with mental retardation. All instruction was individual and took place over 29 days. A multiple baseline design across participants was employed to examine changes across baseline, instruction, and maintenance conditions on spelling performance.

All three students demonstrated increases in performance relative to baseline conditions for spelling accuracy during the intervention. This may be due to students being given the opportunity to respond actively by pronouncing and spelling several words as well as manipulating materials. However, it is impossible to decipher unique effects of each instructional component (i.e., repeated exposures, corrective feedback, segmenting sounds, using boxes, and sorting words into groups). Also, the study emphasized accuracy of words but neglected the critical feature of fluency when spelling words. In addition, the absence of mastery criteria was another limitation of this study. Future research should utilize mastery criteria to increase systematically the number of

words taught to students with disabilities as instruction progresses and thereby increase the likelihood that students master more words by the end of an academic school year.

One way to get students to perform at mastery is to teach them at their instructional level. Although teachers usually group students by ability for reading instruction, they seldom do for spelling. The design of most basal programs provides one book or level per grade, which could discourage ability grouping. “When a third-grade teacher is issued 25 third-grade spelling books and an accompanying teacher’s guide at the beginning of the school year, the underlying message is, “… one size fits all” (Morris, Blanton, Blanton, & Nowacek, 1995, p. 164).

Teaching students to mastery and advantages to teaching students at their instructional level, was examined by Morris, Blanton, Blanton, and Nowacek (1995) in a year long study. This large-scale study included four third-grade and two fifth-grade classrooms. The seven teachers taught spelling each day using a commercial spelling program of either Mifflin Spelling (Henderson et al., 1985) or Steck-Vaughn (Pescosolido, 1984). Students were divided into low-spellers and high-spellers according to the percent correct on each of the third-grade pretests (Houghton Mifflin and Steck-Vaughn). The criterion for the low-spelling group was scoring below 30% on the third-grade pretest and below 65% correct on the second-grade pretest.

Both the second- and third-grade teachers divided the programs into 36 weekly units. The first six units provided a review of spelling patterns introduced the previous year. All seven teachers taught the students from the third-grade spelling book during the first six weeks of school. At week seven, intervention teachers A and C began to teach their low spellers from a second-grade spelling book. The two teachers continued this

differentiated instruction (grade-level and below-grade level) for 24 weeks. Teachers B and D followed a similar plan of the second-grade instruction with their low spellers, but they began at week 18. Teachers E, F, and G did not intervene with their low spellers. All students in these classes worked in the third-grade spelling book, regardless of level, until the end of the school year. Both programs were similar in that instruction included: (a) introducing the spelling words on Monday and highlighting the patterns to be studied, (b) guiding students through spelling book practice activities on Tuesday, Wednesday, and Thursday, and (c) administering the spelling test on Friday. Throughout the year, students were given a weekly test, six-week review tests, end-of-year posttest, and a transfer test.

Results indicated that students who worked in the second-grade spelling book for part of the year, scored higher than the comparison group students on the second-grade spelling posttest (75% to 64%). There was a significant difference on the third-grade transfer test (a list of words not taught throughout the year) more so than the comparison group (47% to 37%).

When focusing on the low performing students in isolation, the effects of the instructional intervention were even stronger. This group outperformed the comparison group on the second-grade posttest (70% to 51%) and on the third-grade transfer test (41% to 27%). This finding is particularly important because these third-grade students lacked a foundation of most second-grade spelling content at the beginning of the school year. In this study, the intervention group (students taught at their instructional level) clearly out gained the comparison group in terms of second-grade spelling acquisition. Furthermore, students who were furthest behind in spelling ability in September were the students who benefited most from the intervention.

The previously discussed spelling interventions include at least one change in an instructional variable to examine its effectiveness on students' spelling performance. These studies included strategies, or techniques for students with mild learning and behavior problems that: (a) examined explicit instructional techniques, (b) taught rule-based strategies, (c) employed student lead techniques, (d) presented analogy strategies, (e) implemented word boxes and word sorts, and (f) taught students at their instructional level. These studies represent a wide range of instructional interventions utilized in most classrooms today. Classroom teachers who use these techniques or methods are in a position to enhance the spelling instruction for students with mild learning and behavior problems.

Explicit and Systematic Instruction

Typical commercial programs rely on students learning generalizations about how the English language works (Abbott, 2000; Hesse, Robinson, & Rankin, 1983). However, students with mild learning and behavior problems need explicit and systematic instruction to be successful. Explicit spelling instruction is the unambiguous, clear and direct teaching of skills and strategies. There are several characteristics of explicit instruction that facilitate simplified instruction for the student, with no need for inference and no difficulty in understanding what is being asked of them. For example, instruction should include: (a) clear instructional goals, (b) clear objectives, (c) understandable directions and explanations, (d) adequate modeling, (e) guided and independent practice with corrective feedback, and (f) cumulative and summative assessments (Stein, Carnine & Dixon, 1998).

Winterling (1990) examined the effects of some of the components considered to be explicit and systematic instruction. The purpose of his study was to evaluate the effectiveness of a treatment package consisting of constant time delay (student think time), drill-and-practice, and token reinforcement in teaching sight words to a small group of three students with disabilities. Three students (two males and one female) who were receiving services in a resource room participated in the study. Two of the students were classified as having mental retardation and the third student was classified as having a learning disability. The students' average age was seven-years-old. Lessons lasted 20-30 minutes and were conducted three or four days a week. Students could earn reinforcement under two contingencies: correct responses and attending. A multiple probe design across word sets, replicated across subjects, was used to assess the independent variables.

Data from all three students indicated the teaching procedures were effective in teaching students to spell. Error rates also dropped for all three students. The training format appeared to facilitate the learning of new spelling words. However, practice in writing their spelling words produced no academic gains for one student. This study extended other research by showing the effects of instructional variables in combination with reinforcers as an effective and efficient way to teach spelling to students with disabilities.

Since this study used a treatment package, it is not possible to infer that any one single strategy may have been just as effective alone. For instance, the use of constant time delay, token reinforcement, or drill-and-practice alone could have produced similar results. Furthermore, the study was not designed to address maintenance or retention of

spelling words. This study only had three subjects which makes it difficult to generalize the results to larger populations.

A later study by Castle, Riach, and Nicholson (1994) focused on the effects of phonemic awareness instruction within a whole language program. This experiment involved a larger group of students than the Winterling study (30 total; around the age of five; varying abilities). The experimental group of 15 children were trained in two lessons a week for 10 weeks of phonics instruction. The other matched group of 15 children remained in the school's already implemented whole language class. The purpose of the study was to determine whether the addition of phonemic awareness training had more of an effect on students learning to spell than the regular writing program (whole language) alone.

Twice a week the experimental group covered specific topics and activities aimed at increasing phonemic awareness. Instruction included phoneme segmentation, phoneme substitution, phoneme deletion, and rhyme. These skills were taught using a variety of games. An example was 'concentration,' where students were required to find matching cards that had the same initial, median, or final phoneme. The control groups' instruction involved the process of writing activities, where the students wrote their own stories and invented their own spelling.

Results from a series of one-way analysis of variance (ANOVA) showed that the gains made in the experimental group versus the control group were statistically significant ($F(1,4) = 33.92$, $p < .01$). Phonemic awareness training contributed to the spelling development by enabling the students to use phoneme-grapheme rules. Teaching phonemic awareness to young students would benefit from the additional instruction to

their regular work in the classroom. However, the specifics of techniques or teacher wording that should be incorporated was not defined or discussed. This lack of defining explicit and systematic teaching within this particular study would make it hard for future researchers to replicate.

A similar study by Butyniec-Thomas and Woloshyn (1997) explored whether explicit strategy-instruction combined with whole-language instruction would improve third-grade students' spelling more than either explicit-strategy instruction alone, or whole-language instruction alone. A total of 37 third-grade students (18 boys, 19 girls) of varying abilities participated in the study. Spelling instruction lasted five days with sessions lasting around 20 minutes. Students were given a pretest, immediate posttest, and a two-, six-, and nine-week posttest. This analysis consisted of 40 previously taught words and 17 transfer words.

The students in the strategy conditions received: (a) explicit-instruction in the use of word building, syllabic segmentation, and imagery as spelling strategies, and (b) information about why, when, and where to use each strategy. The student in the explicit-strategy-plus-whole-language group studied target words in the context of a story, whereas strategy-only students studied the target words in isolation. Students in the whole-language group used the target words as they completed meaningful reading and writing activities.

Results indicate that for every posttest measure the spelling performance of the students assigned to the explicit-strategy-plus-whole-language group outperformed the whole-language group ($q = 5.46$, $p < .01$). The students who received explicit-strategy-plus-whole-language group also outperformed the students who received explicit strategy

instruction alone ($q = 2.90$, $p < .05$). The students who received explicit-strategy instruction also outperformed the students who received whole-language instruction ($q = 2.96$, $p < .05$). This same pattern of performance was also seen with the transfer words.

Providing students with the explicit-strategy when teaching spelling was more beneficial than providing them with whole-language instruction. Most of the students required some type of formal spelling instruction in order to become proficient spellers. However, there are many noteworthy limitations to this study. The brevity of the study (five days) makes it difficult to infer the effectiveness of the instructional approaches. Students could have simply done better because they were introduced to a new type of instruction, thereby improving performance. Poor instructional details (what and how teachers taught; teacher wording) also make it difficult to decipher its true effectiveness on spelling performance. Furthermore, the limited use of transfer words was examined. It would be difficult to tell if students had actually acquired the skills necessary to spell new words.

A study by Darch, Eaves, Crowe, Simmons and Conniff (2006) provides a current look at the effects of a rule-based strategy versus a traditional approach. The participants were 42 second- through fourth-grade students receiving special education services. Students were randomly assigned to either the rule-based strategy group that focused on teaching students specific spelling rules, or the traditional group that provided an array of spelling activities. Once again, the results indicated that the rule-based strategy instruction was more effective in increasing the students' spelling performance. The rule-based strategy group achieved 68.4% accuracy, while the traditional group performed at 45.2% accuracy ($F[1,40] = 13.44$, $p < .05$). Furthermore, both groups performed poorly

on retention and transfer tests. Thus, spelling programs should provide sufficient guided and independent practice to mastery so that students can apply a strategy within other contexts.

Summary of Intervention Studies

In conclusion, these studies document the range of effective methods for improving the spelling skills of students with and without disabilities. Table 1 summarizes the major structures of the intervention studies based on effective instructional practices for students with mild learning and behavior problems.

Table 1

Review of Intervention Studies

References	**Sample size and ages**	**Procedures**	**Intervention**	**Results**
Brown et al. (1996)	28 at-risk students (12 girls, 16 boys)	Effects of analogy instruction on spelling performance	36 weeks	Analogy use increased from 13% to 87% for spelling words correctly
Englert et al. (1985)	22 students with LD and educable mentally retarded	Strategy use for spelling new words by using spelling patterns from known words	4 weeks (daily; 20 minute lesson)	Supports the notion that direct training in strategies is effective for the correct spelling of novel words.
Joseph (2002)	3 students with mild mental retardation (9-10 years old)	Use of word boxes and word sorts to increase spelling skills	29 days (40 minute sessions)	Statistically significant differences from baseline through intervention
Kearney & Drabman (1993)	4 males (mean age = 11.98)	Write-say method with feedback to dual sensory modes	9-weeks (30-minute sessions)	Overall improvement from baseline = 58.8%-88.6%

(table continues)

Table 1 (continued)

References	Sample size and ages	Procedures	Intervention	Results
Wirtz et al. (1996)	6 third-graders (3 girls, 3 boys) At-risk	Traditional versus self-correction	10-weeks (30-minute sessions)	Students maintained their ability to spell previously learned words
Thompson & Block (1990)	135 fifth- and sixth-grade students (all ability types)	Multiple choice (recognition) versus production (recall) for spelling performance	20-minute sessions	Recall was superior to recognition conditions
Darch & Simpson (1990)	28 students with a LD	Rule-based strategy versus visual imagery mnemonic	25 days of instruction (25-30 minute sessions)	Rule-based strategy group outperformed imagery group on all three probes.
Morris et al. (1995)	48 third-graders (varying abilities)	Teaching students at their instructional levels; use of basal programs	36 week intervention (20-minute sessions)	Instructional level group outperformed control groups (75% to 64%)
Winterling (1990)	3 students with learning and behavior problems (2 females; 1 male)	Effects of a treat-ment package and small group instruct-tion on spelling performance	39 sessions (15-20 minute lessons)	Students increased up from 3% to 90% correct on spelling words. No maintenance test.

Table 1 (continued)

References	Sample size and ages	Procedures	Intervention	Results
Castle et al. (1994)	30 kindergartners of varying ability.	Effects of phonemic awareness instruction with a whole language program	2 lessons a week for 10 weeks	Phonemic instruction was found to be beneficial to students of all types.
Butyniec-Thomas & Woloshyn (1997)	37 third-graders of varying ability	Effects of explicit-strategy and whole-language instruction on spelling ability	1 week (20 minute sessions)	Explicit-strategy within whole language instruction was statistically superior.
Darch et al. (2006)	42 second- through third-grade students with LD	Rule-based strategy versus traditional instruction	Daily; 30-minute lessons (20 days total)	Rule-based strategy was effective in increasing performance.

Little efficacy exists for the use of computer-aided approaches. However, the use of spelling strategies, and explicit and systematic instruction had an impact on spelling performance. Students benefit from being taught to spell words through explicit-instruction, but sometimes fail to transfer those newly acquired skills to novel words (Butyniec-Thomas & Woloshyn, 1997). Spelling programs should focus on pinpointing effective strategies for teaching students. Since the poor spelling of students with mild

learning and behavior problems may be related to difficulties with language, memory, phonological awareness, visual and motor processes, and inefficient study strategies, programs should address these needs with instruction that provides a developmental sequence of words, empirically effective instruction and cognitive strategies (Mushinski-Fulk & Stormont-Spurgin, 1995). Overall, the most important conclusions emerging from these studies are as follows.

- Limit the number of words introduced in a lesson; three to four words a day appears to bring the best rate for learning and retention.
- Early instruction should focus on high-frequency words.
- Having student name the letters as they write them is helpful.
- Error imitation, modeling of correct responses in unison results in increased achievement.
- The use of computer programs can help facilitate positive attitudes toward the practice of spelling words.
- Previously taught words should be periodically reviewed to promote retention.
- A minimum of 60-75 minutes per week should be allotted to spelling instruction.
- Explicit and systematic teaching is beneficial to any student's ability.
- Word boxes and word sorts prove helpful in making letter-sound correspondences for young spellers.

Review of Research on Spelling Programs

The purpose of this section is to summarize the literature on current spelling instructional programs and their methodology. This review will describe the three major categories of spelling instruction: (a) phonemic approach, (b) whole-word approach, and (c) morphemic approach. A review of popular commercial programs will also be outlined. Relevant research on the effectiveness of these programs for students with mild learning and behavior problems will be examined. Finally, a discussion of advantages and limitations of these programs will be discussed.

Phonemic Approach

Spelling curriculum that uses explicit instruction within letter-sound relationships to teach spelling words has been effective in teaching students to spell accurately. Successful spelling performance is built on an understanding of the relationship between letter-sounds and their corresponding sounds. The National Reading Panel (NRP, 2000) found that systematic phonics instruction boosted the spelling skills of all types of students. Letter-sound correspondence is a fundamental skill for promoting spelling success. The ability to segment words orally into their component sounds does not always ensure accurate spelling. However, the great value of this skill is that it reduces the number of types of misspellings that students typically make. For example, students may transpose letters in words (srtip for strip), they may leave out letters, or add letters to words. Students who are proficient at segmenting words orally are not likely to make these types of errors.

Some programs, regardless of instructional type, may include some principles of direct instruction (DI). An impressive body of research has supported DI as an effective approach for teaching academic skills and strategies to students with learning and behavior problems (Tarver, 1996). Some of these principles are common to many behavioral education models: (a) using reinforcement and mastery learning principles, (b) assessing regularly and directly, (c) breaking tasks into small components through task analysis, and (d) teaching prerequisite skills (Kinder & Carnine, 1991). Instructional materials and teachers' delivery of material must be clear and unambiguous for faultless communication to take place (Engelmann & Carnine, 1982). Programs usually contain some or all of the direct instruction (DI) components. These 11 components include:

1. breaking down a task into smaller steps,
2. administering probes,
3. administering feedback repeatedly,
4. providing a pictorial or diagram presentation,
5. allowing for independent practice and individually paced instruction,
6. breaking the instruction down into simpler phases,
7. instructing in a small group,
8. modeling by teacher of skill or behavior,
9. providing set materials at a rapid pace,
10. providing individual child instruction, and
11. presenting new materials by the teacher (Engelmann & Carnine, 1982).

Furthermore, in the initial stages of instruction, every step in applying a rule is explicitly taught. This is done by making an unobservable process (thinking) into an overt

observable task, rather than a teacher simply stating the rule and its use. Students are provided with a series of carefully sequenced set of examples with guidance from the teacher using the new rule or strategy. These examples provide a range of words that vary but maintain common (i.e., rhyming words, words that end in *–ing*). This variety allows students to generalize the rule or strategy to future instances. Students sometimes learn concepts more quickly when examples and nonexamples (critical feature stays the same; aids in discrimination) are juxtaposed creating minimally different pairs. For instance, *flapping* followed by *flapless*, might be examples used when teaching students to add suffixes.

Steps are made to be overt in order to ensure that students are immediately successful. When students can perform a task independently and to automaticity, the overt steps are made covert by gradually reducing the number of leading questions asked. This is done through the rapid pacing of instruction that keeps the students interest. A fast pace also allows more material to be covered in a given amount of time (Kinder & Carnine, 1991).

It is vital that students receive consistent and immediate feedback (Brophy & Good, 1986). Teacher feedback is determined by the type of error the student makes. That is, if the error is caused by lack of information or misuse of a rule or strategy, teachers provide the information to remedy the lack of information errors. To correct a strategy error, teachers prompt the students to use the strategy questions used when initially being taught the skill (Carnine, 1980).

These instructions are best carried out in a small group setting. There are many advantages to small group instruction. This intimate setting provides an emphasis on oral

communication. It also provides an atmosphere that allows for repetitious practice to develop skills to automaticity (Foorman & Torgesen, 2001; Kinder & Carnine, 1991).

The *Spelling Mastery* program (Dixon & Engelmann, 1999) is one example of teaching students through the principles of direct instruction. This program emphasizes the importance of teaching letter-sound relationships. *Spelling Mastery* consists of six instructional levels (Levels A through F) with a total of 660 lessons. Lessons within each level are carefully sequenced so students learn simple spelling strategies (letter-sound correspondences; regular words) before more complex spelling strategies (spelling rules, irregular words or strategies). Each lesson introduction is sequenced to minimize student errors. For instance, the letter *b* and *d* are introduced in separate lessons in order to avoid confusion. Over the course of many lessons, auditory and visual prompts are removed as students move into automaticity.

A study by Burnette, Bettis, Marchand-Martella, Martella, Tso, et al (1999) used the *Spelling Mastery* program. The purpose of their study was to examine the efficacy of the *Spelling Mastery* program in an across grade implementation to a whole-word approach in a Title 1 school. The researchers also wanted to know if greater improvements in students' spelling over time on predictable and unpredictable words were found when correct letter sequences in words were analyzed.

A total of 446 students participated in the study. All of the first grades, two second grades, two fourth grades, and all fifth- and sixth-grades implemented the *Spelling Mastery* program. The remaining classrooms in the school used the whole-word approach.

The results of this study demonstrated that the spelling skills of students exposed to *Spelling Mastery* greatly improved the spelling skills at every grade level. However, since students were exposed to different reading instruction and curriculum formats, it is difficult to confirm the effectiveness of the program. For example, some students received the *Spelling Mastery* instruction with the *Reading Mastery* program or the whole-language reading instruction.

A study that focused on the effects of one level within the *Spelling Mastery* program was done by McCormick and Fitzgerald (1997). The purpose of this study was to evaluate the effectiveness of the *Spelling Mastery* program Level F. The subjects were 22 sixth-grade girls of varying abilities who participated in the year-long study. Lessons were 20 to 25 minutes long and were taught three lessons per week. Results indicated that the *Spelling Mastery* program had a high degree of effectiveness. However, no pretest data was available to measure actual student gains made throughout the year.

Whole-Word Approach

The phonemic approach to spelling can be used effectively to teach words that are spelled just like they sound. Most words in the English language cannot be spelled correctly using letter-sound correspondence. These irregular words cannot be sounded out. To teach irregular words, the whole-word instructional approach to spelling is necessary (Simonsen & Gunter, 2001). Commercial programs that use the whole-word approach have been shown to produce highly accurate spellers (Larsen & McLaughlin, 1997).

Many of these programs rely on rote memorization for irregular words instead of teaching rules or strategies. A typical program groups together lists of words based on

similarities. For instance, words could be listed together because they start with *sh-* or *th-*; some words might relate to a particular state or continent (Simonsen & Gunter, 2001). This forces the student to rely on memorizing a words' spelling. Dixon (1993) equates it to having student memorize the answers to multi-digit subtraction problems instead of teaching them the rule for borrowing.

The whole-word approach to spelling typically uses either implicit or explicit learning strategies for students to memorize spelling words. Implicit instruction is exposing students to the words they should learn but may not provide guidance on how to acquire the necessary skills to spell. Explicit learning strategies follow the philosophy that students need to be guided by teachers through simplified steps in order to learn a skill or concept.

The Add-A-Word spelling program is an explicit, whole-word approach to spelling instruction (Pratt-Struthers, Struthers, & Williams, 1993). The Add-A-Word program utilizes individualized spelling lists. Students study their lists daily using various techniques including the study, copy, cover, and compare strategy. At the end of each lesson, students take a test on their spelling words. A student is considered to have achieved mastery when he has spelled the word correctly for three consecutive days. The mastered word is then dropped from the list and a new word is added (Simonsen & Gunter, 2001). This explicit, whole-word approach to spelling has been shown to be effective in teaching students to spell words.

Struthers, Bartlamay, and Bell (1981) studied the effects of the Add-A-Word spelling program or the Add-A-Word plus public posting of grades would increase student spelling performance. The participants were eight students with mild mental

retardation and behavior problems being served in a resource room. A multiple baseline design was used over a 25-day period. The results of the present experiment indicated that the percentage of words spelled correctly increased more so when the Add-A-Word program was coupled with the public posting of individual performance. The overall means across all students were 60% at baseline, 81% with the Add-A-Word program, and 94% for the ADD-A-Word program with public posting. Limitations of this study included lack of a mastery measurement beyond three days and no transfer tests on spelling accuracy into other academic areas.

Pratt-Struthers, Struthers, and Williams (1983) focused their study on the effects of the Add-A-Word program. Their students were nine fifth- and sixth-grade students with LD attending a resource room for remedial reading. The authors wanted to determine whether the correct spelling of these students, within the context of creative writing, could be improved with the program. Target words were chosen by frequency of student use, but had consistently misspelled. Each child was reported to have spelled all target words correctly for two consecutive days using the program. All students mean percent of correct target words was above 80%. The Add-A-Word program was shown to be more effective than traditional spelling approaches for teaching students with disabilities to spell.

Another example of a Whole-Word spelling strategy is the Write-Say method. The previously discussed study by Kearney and Drabman (1993) found that a small sample of students with disabilities improved their spelling accuracy by 34.9% within the seven-week study. This technique has students independently studying their spelling words using a series of exercises. Students are to look at the word, touch each letter while

spelling the word, cover the word, and write it down on a separate sheet of paper. The student is then supposed to uncover the word to check for correctness. This approach requires students to be autonomous in their learning, something that students with special needs find difficult. Certain programs with any of these approaches sometimes leave out the critical element of mastery through review. Reviews that include ample, distributed, cumulative and varied practice (Simonsen & Dixon, 2004).

Other examples of Whole-Word programs that are being used in the classroom include HBJ Spelling, Silver Burdett Spelling, Zaner-Bloser Spelling, Target Spelling, and Everyday Spelling. Table 2 provides an exhaustive review of these programs.

Table 2

Overview of Spelling Programs

	HBJ Spelling	**Silver Burdett Spelling**	**Zaner-Bloser Spelling**	**Spelling Mastery (SRA)**	**Target Spelling (Steck-Vaughn)**
Content	A comprehensive basal program. Teaches letter-sound relationships through various language arts activities. Structured for all ability types.	Systematic program emphasizing word structure and meaning. Phonics based.	Straightforward and efficient instruction. For students of all ability levels. Designed to be coupled with handwriting program.	Sound-symbol strategy. High frequency irregular words; spelling rules; morphographic base words; spelling rules w/ multisyllabic rules. Includes spelling vocabulary, entymology usage and syntax.	Words are phonetically grouped to other similar words and includes a section of common sight words.

Table 2 (continued)

	HBJ Spelling	Silver Burdett Spelling	Zaner-Bloser Spelling	Spelling Mastery (SRA)	Target Spelling (Steck-Vaughn)
Vocabulary	Generally appropriate. Certain terms are not pre-taught. Teacher directions are provided at the bottom of pages.	220 Dolch words to 720 upper grades words. Bonus words and spelling demons provided.	Vocabulary based upon grade level. Includes content area terms.	Carefully sequenced lists to avoid confu-sion. Most frequent words, most frequent irregular words moving onto more complex.	Contains 162 Dolch words.
Organization	Weekly lessons; 3 or 5 day unit tests. Each unit offers 3 ability levels: basic, mastery and bonus words.	Weekly lessons. Includes reviews and writing exercises. Along with 6-week reviews.	Weekly patterns of word study, review and testing and each grade level. 36 units per level.	Skills, patterns and rules are systematically taught through-out numerous lessons. Organized around phonemic, whole-word and morphographic approaches.	Moves form phonics to linguistic patterns, misspelled homonyms, with prefixes and suffixes, and words of up to 4 syllables.
Additional Materials	Teacher's edition, practice duplicates, testing program and microcomputer components.	Teacher manual; blackline resource and practice masters, spelling dictionary, glossary, summary of useful rules, test packet.	Teacher's manual. Practice duplicate masters. Flexible testing options; graded lists of extra words.	Teacher presentation book; student wordbook; progress report folder; blackline masters and reproducible progress charts.	Teacher's editions; activities for different learning modalities and supplemental suggestions for different learners.

Table 2 (continued)

	HBJ Spelling	Silver Burdett Spelling	Zaner-Bloser Spelling	Spelling Mastery (SRA)	Target Spelling (Steck-Vaughn)
Teaching Method	Three learning strategies: memory, phonology/morphology and analogy. Words are based on frequency of use in reading. Provides reinforcement activities.	Clear directions and easy to follow lessons. Encourages pupils to proceed independently with writing and proofing work.	Visual, auditory and kinesthetic activities used to work toward specific objectives in each unit. Special sections for individual needs.	Direct instruction methods; students are encouraged to think their way through spelling rather than memorization. Instruction is initiated under the direction of a teacher.	Teaching through recognition in context, visual discrimination, word analysis, writing practice and creative writing.

Morphemic Approach

In the morphemic approach to teaching spelling, students learn to spell words through morphographs rather than whole words. A morphograph is the smallest unit of identifying meaning in written English. For example, the prefix *re-* means to do again, or the suffix *-ing* means "in the process of." Morphographs include prefixes, suffixes, and bases or roots. For instance, the word *recovered* is made up of the prefix *re-*, the base word *cover*, and the suffix *-ed*. Students are also taught the rules for combining morphographs in order to spell words correctly. When using this approach, students would be taught that when a base ends in the letter *e*, and is to be combined with the suffix *-ing*, the letter *e* is dropped to make the new word (i.e., *trace* becomes *tracing*) (Simonsen & Gunter, 2001).

The morphemic approach to spelling has several advantages. In general, most morphographs are usually spelled the same way across different words. The morphograph *port* is spelled the same in the words *deport*, *report*, *porter* and *important*. Also, when the spelling of a morphograph changes across words, it changes in predictable ways (Hesse, Robinson, & Rankin, 1983), making it easier for students to transfer knowledge. The number of morphographs is much less than the number of actual words in the English language, and the number of rules for combining them is relatively small. "Therefore, teaching students to spell morphographs and teaching the rules for combining morphographs will allow students to spell a far larger set of words accurately than by teaching individual words through rote memorization of weekly spelling lists" (Simonsen & Gunter, 2001, p. 101).

For example, assume that a student can spell only three morphographs: *re*, *cover*, *ed*. Then, the student learns just 3 to 7 more morphographs: *dis*, *un*, *ed*, *pute*, and *able*. The slight increase from 3 to 7 new morphographs allows the student to spell words such as *recover, recoverable, unrecoverable, unrecovered, repute, reputable, reputed, disreputable, disrepute, coverable, covered, uncover, uncoverable, uncovered, discover, discoverable, discovered, undiscoverable, undiscovered, dispute, disputable, disputed, undisputable,* and more. All of these words are the result of simple combinations of rules or strategies to produce the correct spelling of words (Dixon, 1991).

Spelling Through Morphographs explicitly teaches the use of morphographs. As discussed earlier, students master a small set of morphographs and then learn to combine these morphographs into multisyllabic words (Simonsen & Dixon, 2004). The *Spelling Through Morphographs* program is composed of 140 lessons in which students are taught

to spell several hundred morphographs and fourteen spelling rules for combining them into words. Five hundred basic words are built upon to generate as many as 12,000 words. "When students complete the first half of the program, students can spell more than three thousand words and parts of thousands of more words" (Dixon & Engelmann, 2001, p. 7). The program is designed for students learning English as a second language or students with varying disabilities, between 4^{th}-12^{th} grades.

In comparison to the *Spelling Mastery* program, *Spelling Through Morphographs* can be used as an accelerated program for students who have the prerequisite skills for manipulating letter-sound correspondences (Simonsen & Dixon, 2004). It should be noted that *Spelling Mastery* incorporates the phonemic, whole-word and morphemic approaches to spelling. The first two levels (Levels A and B) of *Spelling Mastery* places a heavy emphasis on directly teaching letter-sound relationships while moving into an explicit, whole-word approach to teaching high-frequency, irregular words that cannot be spelled by phonemic rules. Other advanced levels provide students instruction on conducting complex analyses of words using their knowledge of morphographs, morphographic rules and their meanings. The program provides scaffolding or prompting when initially learning new words, and then systematically reduces the prompts over time (Simonsen & Gunter, 2001).

In general, a whole unit lesson in *Spelling Through Morphographs* allows students to receive practice in spelling each new morphograph through both verbal and written exercises. Students are provided additional practice to mastery, and then taught to build words through a series of exercises (Maggs, McMillan, Patching, & Hawke, 1981).

Research has demonstrated that students make substantial gains in spelling performance by comparing the before and after instruction gains using the *Spelling Through Morphographs* program. This program also has demonstrated its effectiveness on students in the general education classroom (Burnette et al., 1999; Vreeland, 1982) as well as students with mild learning and behavior problems (Hesse et al., 1983; Maggs et al., 1981; Robinson & Hesse, 1981).

Robinson and Hesse (1981) examined the effects of *Spelling Through Morphographs* for students of low, average, and high spelling intelligence. One hundred forty-three seventh-grade students completed 140 lessons over an eight-month period. The results of this study provided positive data on *Spelling Through Morphographs* according to how well it teaches what it claims to teach, the program's effects on students' spelling achievement, and its effects on students at different levels of spelling achievement. This study also showed the program teaches a small set of reliable, morphemically based spelling rules that enhance generalization to a larger group of unknown words. Since the program is designed to include half of the test words not taught during lessons, it can be assumed that some transfer of skills took place for those who received instruction through the program. Nevertheless, future studies need to assess the longitudinal effects of the program on students' transfer knowledge.

Maggs, McMillan, Patching, and Hawke (1981) had similar findings when using the *Spelling Through Morphographs* program. The subjects consisted of 132 general education students, with 31 students receiving remedial reading instruction. All 31 students had severe spelling deficits. Groups A, B, and C were the regular education students, and group D, consisted of the remedial students. All students gained eight or

more months of spelling achievement by (three general education groups) 97%, 85%, and 75% respectively, with the remedial group gaining 58%. Both the regular education students and the remedial group performed better than expected. This highlights the advantage that the necessary skills are developed in order for every child to make progress, or in some cases, more than adequate progress. The remedial group learned at a faster rate than their average peers. The majority of the children made from two to three years gain in spelling age after the eight months of instruction. Conversely, transfer and maintenance tests were not included in this study.

A later study by Hesse, Robinson, and Rankin (1983) wanted to broaden the literature on the effectiveness of the *Spelling Through Morphographs* program. To extend beyond earlier studies, researchers examined the retention of spelling skills and the students' ability to transfer their learning to novel situations. One hundred forty students in the seventh-grade received one year of instruction. One hundred nine of the 140 students took a standardized retention test at the end of their eighth-grade year. These tests indicated that spelling skills obtained by students were retained even after instruction had stopped. Yet, no transfer of learning to other areas was assessed.

The purpose of this section was to summarize the literature on current spelling instructional programs and the methodology behind them. Table 2 outlines the major components of popular spelling programs. Relevant research on the effectiveness of these programs for students with mild learning and behavior problems was discussed. Spelling programs that teach spelling through phonemic, whole-word, and morphemic approaches while including direct instruction components are highly effective in teaching students to spell. Research suggests that one approach is not superior to another. Rather, the

inclusion of error correction, review, distributed practice, feedback, carefully sequenced words, teaching a rule or strategy, leads to improved spelling performance.

Overall, students taught *Spelling Through Morphographs* and *Spelling Mastery* were consistently more accurate in their spellings than students taught to spell through other spelling curriculums (Simonsen & Dixon, 2004). For students with mild learning and behavior problems, these findings are especially promising, since these newly acquired skills can carry over into improved reading and writing in the content areas.

Methodological Issues

A review of research outcomes not only enables researchers to identify effective spelling instruction for students with mild learning and behavior problems, but also allows for the evaluation of research methodologies that are presently used. The results of studies can be compromised by methodological problems and limitations. Such limitations can include length or duration of treatment, or settings in which the intervention or observations took place. Other methodological issues can arise from researchers not being able to truly control for chronological age, gender, socioeconomic status (SES), or ethnicity. Additionally, other issues such as sample size, definitions of variables, and methods for measurement are important when considering the results of studies.

The purpose of this section is to review the methodological concerns and limitations of the 23 previously reviewed articles. From these studies, five broad areas of concern were identified. These areas are: (a) sample characteristics, (b) treatment descriptions, (c) fidelity of treatment, (d) intervention length, and (e) measurement.

Sample Characteristics

One of the basic tasks in human research is sample selection. Out the 23 reviewed articles, subjects were chosen by: (a) students meeting the state criteria for having one of the 13 defined disabilities by IDEA, (b) chronological age, (c) mental age, (d) grade level, (e) being "at-risk," (d) receiving remedial reading instruction, and (e) IQ or achievement scores. Other subject-related variables that were sometimes reported included, reading level, motor skill ability, hand preference, phonemic awareness, long and short term memory, computer skills, visual and hearing abilities, having been referred by a parent or teacher, or English was their second language. Some examples of studies including additional criteria with a diagnosis of a disability include work samples (Joseph, 2002), teacher request (Kearney & Drabman, 1993), inclusion of a reading disability (Englert et al. 1985; McAuley & McLaughlin, 1992), and handwriting difficulties (Berninger et al.).

A total of 735 students had mild learning or behavior problems, and 597 students were general education students making a total of 1,332 students participating in the articles reviewed. The mean number of subjects per study was 58. The largest number was 466 students in the Burnette et al. study (1999) and two of the smallest scale studies were Winterling (1999) and Joseph (2002) with three students. This wide range of sample size may be due to the difficulty in accessing students with mild learning and behavior problems. Small sample sizes make it difficult to generalize outcomes to the population. Furthermore, gender was not considered in the data analysis of any studies. McCormick and Fitzgerald (1997) conducted a study with only female students and all other studies were heterogeneous. Two studies defined their sample as "at-risk" or "lack of reading or

spelling ability" without defining what those terms actually mean (Englert et al. 1995; Kearney & Drabman, 1993).

Out of the 23 articles reviewed, six large-scale studies consisted of over 100 subjects (Burnette et al., 1999; Hesse et al., 1983; Maggs et al., 1981; Morris et al., 1995; Robinson & Hesse, 1981; Thompson & Block, 1990). The remaining 17 articles ranged from 3 to 42 subjects, with the majority reporting around 24, respectively.

The grade level ranges of the studies were first- through the seventh-grade. There were three studies for each of the first-, third- and seventh-grades. The majority of studies were carried out in sixth grade classrooms. Twenty-two percent of the studies were carried out across grade levels. No studies of high school students were analyzed for this review. This highlights the lack of spelling interventions with older populations.

Treatment Description

Treatment descriptions should include specific instructional and behavioral conditions so that each component can be measured. Poorly described instruction makes it difficult to replicate a study. Berninger et al. (1998) described their instruction as three layers. For the first 5 minutes of instruction, teachers taught phonics through pictionary, then for the next 7 minutes, teachers taught an unidentified number of words by showing connections between units of spoken and written words. The last 8 minutes of instruction allowed for students to compose stories and share their stories by reading them aloud. There was no discussion of teacher wording during the intervention.

Some studies provided vague descriptions on how instruction was adapted to meet the needs of the students with mild learning and behavior problems. For example, Daal and Leij (1992) instructed their subjects to: (1) copy the target word from the computer,

and (2) memorize the target word and write it from memory. The first step was to ensure a “fail safe” learning situation for students with disabilities. In one study, students were taught to use proofreading marks to assess their spelling (Wirtz et al., 1996). Castle, Riach, and Nicholson (1994) described their studies instruction as phoneme-grapheme substitutions, and rhyme through the use of instructional games. These poor descriptions make it difficult to ascertain which variable truly had an effect on student spelling performance. Therefore, researchers need to define, in replicable terms, the specific activities comprising the independent variable(s) and under what circumstances they were utilized.

However, studies that employed programs (Darch et al., in 2006; Darch, & Simpson, 1990; Maggs et al., 1981; Robinson & Hesse, 1981; Struthers et al., 1981) provided brief descriptions of those programs with instructional objectives, teacher behavior, and student expectations, thus making the studies easier to replicate. Nevertheless, it is not possible to infer the role that anyone single strategy from those programs may have been effective independently. When future researchers are presented with vague guidelines void of concrete examples of instructional procedures, interventions run the risk of being implemented inconsistently, thereby compromising the integrity of instructional procedures.

Fidelity of Treatment

The goal of intervention research is to demonstrate that changes in a dependent variable are related to systematic, manipulated changes in an independent variable and are not due to other extraneous variables. Fidelity of treatment (sometimes called treatment integrity or procedural reliability) refers to the degree to which treatments are

implemented as intended (Troia, 1999). Some of the reviewed studies inadequately described the measures taken to ensure the integrity with which treatments were implemented. Insufficient or nonexistent assurance of fidelity of treatments makes it difficult to state indisputably, which treatments were effective or ineffective.

Out of the 23 reviewed studies, Berninger et al. (1998) provided the most detail in their treatment integrity. They used a four-pronged approach to ensure that tutors were delivering instruction in a standard and consistent manner. First, timers were used to time different segments of instruction so that tutors could be sure they were devoting equal amounts of time to each component of the treatment. Second, frequent and ongoing discussions with tutors at weekly meetings were provided to monitor and discuss instructional problems. Third, tutors were asked to complete a self-monitoring checklist at the end of every lesson. Fourth, tutors audiotaped two out of their eight lessons. The researcher reviewed both the checklists and the audiotapes. The checklists were described to have included things such as procedures, materials, time allotment for each of the instructional segments, and behavior management techniques.

Morris et al. (1995) provided little explanation to treatment integrity. In short, each teacher's spelling instruction was observed for a full week twice during the school year (Fall and Spring). Observations were done on Monday, Wednesday, and Friday, with audio recordings made of the remaining two days. This "… showed that the intervention teachers followed the spelling book activities closely in working with both the high and low spelling groups" (p. 169).

Winterling (1990) assessed procedural integrity of the treatment by placing two naïve observers to the experimental questions near the instructor. They observed things

such as teachers presenting the stimuli, providing practice, securing student attention, proving prompts, and delivering consequences. Interestingly, this data was also taken at the same time as student data was taken.

Englert et al. (1985), Joseph (2002), and Wirtz et al. (1996) briefly described (two to three sentences) their teacher training, explaining the instructional variable, and providing instructional examples. No descriptions of checklists were provided, just that they were utilized. Data were reportedly taken twice weekly.

McAuley and McLaughlin (1992) carried out reliability measures by having other teachers observe some of the spelling sessions on a random basis to verify the use of either treatment type. No other descriptions were provided. Brown et al. (1996), Castle et al. (1994), Daal and Leij (1992), Kearney and Drabman (1993), and Thompson and Block (1990) provided no information on fidelity of treatment.

Simply "labeling" a treatment as phonemic training or mnemonic instruction provides no information whatsoever to an investigator of the evaluation effort regarding the extent to which the implementation corresponds with how it was intended. Moreover, it is virtually impossible to replicate intervention studies when no data is provided on the extent to which the intervention was implemented with integrity. Gresham, MacMillan, Beebe-Frankenberger, and Bocian (2000) site several factors as being related to the integrity of treatments and the difficulty encountered by researchers in monitoring integrity. These include complexity of treatments, time required to implement treatments, materials and resources required for treatments, and perceived or actual effectiveness of treatments.

Intervention Length

The amount of time allocated to spelling instruction is vital to implementing effective spelling instruction. The studies reviewed represented a wide range of instructional time. The shortest study reviewed was five days (Butyniec-Thomas & Woloshyn, 1997) to the longest lasting 180 days (Hesse et al., 1983; Maggs et al., 1981; Morris et al., 1995). Many of the studies reviewed had a duration of twenty days of instruction. The average of all the studies was 63.5 days of instruction.

The duration of instruction also varied from twice a week to everyday. Castle et al. (1994) added phonics instruction to the whole-language instruction just twice per week. Winterling (1990) and McCormick and Fitzgerald (1997) implemented spelling instruction just three days a week. All other studies implemented instruction every day throughout their study. Time allocated to spelling instruction averaged 25 to 30 minutes per lesson, respectively. Educational settings include resource rooms, special education classrooms and general education classrooms.

Measurement

Effective spelling instruction has been assessed by student progress on vocabulary for which instruction was provided during the intervention. Conversely, few studies examined student performance through maintenance, transfer, and/or generalization tests to other content areas. The few studies that did were Darch and Simpson (1990) who included transfer and maintenance tests to their study. Morris et al. (1995) included a transfer test along with mastery criteria for their subjects. Joseph (2002) claims a major limitation to his study was not implementing mastery criteria. By adding this feature, teachers could increase the amount of words taught while continuing to provide feedback.

Robinson and Hesse (1981) examined the transfer skills of their subjects. The authors urged future research to focus on longitudinal studies focusing on transfer knowledge.

This investigation has revealed that methods for effective instruction include the explicit and systematic teaching of skills and rules that students can generalize to novel situations. The studies that incorporate these best practices may lead students to be more productive academically and give them autonomy in their learning (Burnette et al., 1999; Butyniec-Thomas & Woloshyn, 1997; Darch et al, 2006; Englert et al., 1985; McCormick et al., 1997; Morris et al., 1995; Robinson et al., 1981; Winterling, 1990). It may be in the students' best interest to thoroughly define and teach these instructional components.

Interestingly, Joseph (2002) noted that his study emphasized accuracy but failed to incorporate fluency. Spelling fluency leads to faster letter production, and thus leads to faster sentence production and into paragraph and story production. Pratt-Struthers et al. (1983) was the only study to examine spelling within the context of creative writing and not just on weekly spelling lists. Public posting of student performance was an effective feature only found in the Struthers et al. study (1981). With regard to clinical significance, McAuley et al. (1992) added a student survey for their study and Berninger et al. (1998) included a teacher survey.

The purpose of this section was to present the methodological issues within current spelling research. Methodological issues such as sample characteristics, treatment descriptions, intervention lengths, and measurement were discussed with certain articles highlighting the discussion. Despite these issues, the aforementioned studies were determined to be effective. Moreover, the majority of these studies discussed the need to

determine the extent to which spelling words learned in isolation and are used correctly in other areas of learning.

Summary and Conclusion

Current national and state assessments indicate that general and special education students have difficulties with spelling, sentence structure, and composition. Considerable research has shown that there is a strong correlation between spelling and reading (Ehri & Roberts, 1979; Jorm, 1981; Juel et al., 1986; Read, 1971, 1975). McCutchen (1996) proposed that the act of spelling and handwriting are demanding. So demanding for some that they minimize the use of other writing processes, such as planning and revising, because they exert considerable processing demands on correct spelling.

Spelling is a critical feature for improving the reading and writing skills of students with mild learning and behavior problems. Some of the studies described spelling ability and its' effects on reading and writing among general and special education students. Studies reviewed also described the difficulties in remediating spelling problems. These difficulties sometimes lead students to perpetual academic failure.

Results from the descriptive studies in spelling research suggested that the poor spelling performance of students with mild learning and behavior problems is a result of inadequate spelling material and poor spelling instruction. Studies also described attention difficulties, poor memory, lack of sequencing skills, self-concept, and anxiety as characteristic differences among good and poor spellers. Also, interviews revealed that

students with mild learning and behavior problems tended to feel that academic failure was due to circumstances beyond their control.

Results from the intervention studies revealed that a wide variety of approaches were implemented. Efficacy exists for multiple spelling strategies, and explicit and systematic instruction. Students benefited from being taught to spell words through explicit-instruction (Butyniec-Thomas & Woloshyn, 1997). Support also existed for spelling programs that presented phonemic and morphemic analyses of spelling rules and strategies that lead to teaching students to spell new words through morphographs. Studies that utilized the direct instruction components emphasizing teacher-lead instruction were features that are most effective in teaching students with mild learning and behavior problems to spell.

III. METHOD

The purpose of this study was to examine the effects of two highly dissimilar approaches to spelling instruction with elementary students with mild learning and behavior problems to spell. Procedures for the sample selection and procedures for data collection are discussed. A description of the independent variables and dependent measures are also presented. A rationale for each instructional type are defined and described. Finally, a list of the hypotheses that guided the research will conclude the chapter.

Research Design and Method

The focus of this study was the effects of two highly dissimilar instructional procedures for teaching spelling to third- through fifth-grade students with mild learning and behavior problems. One method, based on the Direct Instruction (DI) model, was focused on teaching students spelling rules in which they used phonemic, morphemic and rule-based strategies to spell words. The second method provided a range of spelling activities found in traditional basal spellers (Harcourt Brace Javanovich, 1988; Scott Foresman-Addison Wesley, 2000; Steck-Vaughn, 2001). Some of these activities included writing words multiple times, defining the words, putting words in alphabetical order, using words in a sentence, and writing creative stories.

This study was experimental by nature, which means that it is the strongest design with respect to internal validity (Campbell & Stanley, 1963). Experimental studies allow for the researcher to identify causal relationships because they allow for observations under controlled conditions, in order to show the effects of systematic changes in one or more variables (Johnson & Christensen, 2000). This study employed a pretest, posttest group design to evaluate the effects of two highly dissimilar instructional approaches. This design is effective for minimizing threats to experimental validity (Campbell & Stanley, 1963). The two teaching methods were randomly assigned to groups. The two teaching methods and their lessons were from two dissimilar commercial spelling programs.

This study compared the means on six dependent measures: (a) pretest, (b) three weekly unit tests, (c) posttest, (d) *TWS-4* standardized spelling test, (e) Student Satisfaction Scale, and (f) maintenance test. The experimenter compared the mean differences between the test scores of the two treatment groups.

Qualitative data was also taken during the intervention. Along with the Student Satisfaction Survey, informal interviews were conducted. Interviews are important to understanding how students with mild learning and behavior problems describe their spelling strategies. Qualitative data should accurately and comprehensively fit between what a researcher records and what actually occurs (Bogdan & Biklen, 1992). Patton (1990) states that, “A reason for using qualitative methods is that for particular outcomes no acceptable, valid, and reliable qualitative measures exist. The state of the art in social science measurement is such that a number of desirable outcome measures still elude

precise measurement" (p. 130). Qualitative research methods may provide useful information for bridging the gap between research and practice.

Blending qualitative and quantitative data can help identify insights that neither approach would produce individually (Roa & Woolcock, 2003). Two students from each grade level were interviewed. Each student was interviewed in isolation and conducted without taping. Denzin and Lincoln (1998) suggest that interviewers not deviate from questions, change questions, agree nor disagree with answers, and dictate responses accurately. The researcher was mindful of these suggestions when conducting the individual interviews.

Informal interview questions were compiled from recent research and were conducted at the conclusion of the study (Darch, Kim, Johnson, James, 2000; Summey, Strahan, & David, 2000). The five interview questions were:

1. What makes somebody a good speller?
2. When you don't know how to spell a word, what do you do to try and spell it?
3. Do you like how we did spelling? Why or why not?
4. Have you used your new spelling skills in another subject?
5. How do you feel when you can't spell a word?

Sample Selection

The researcher obtained 51 participants from one inner city elementary school in a southeast area of Alabama. The school system serves approximately 4,500 students at nine facilities for students from kindergarten through twelfth grade. Students in third through fifth grade were eligible for the study by one of three criteria. First, students who

were considered at-risk and scored in the "intensive" (significantly at-risk) or "strategic" (one or more skill areas not mastered) categories of the Dynamic Indicators of Basic Early Literacy (DIBELS) were eligible for the study. These two DIBELS categories indicate that the students' present level of performance in reading is considerably below grade level. Second, students who qualified for Title I services according to Alabama state guidelines were eligible to participate in the study. Third, students who had classified disabilities in accordance with the Alabama guidelines for identifying students with special needs and according to the Individuals with Disabilities Improvement Act (IDEIA, 2007) were also eligible to participate in the study. Furthermore, these students also had to score 60% or below on the pretest to participate. This pretest established that participants were functioning below average in the area of spelling. Students who missed one day or more per instructional week were not included in the final data analysis. The researcher obtained information such as age, gender, race, grade level, and disability type to report descriptive statistics.

Intervention Timeline

Each participant was randomly assigned to one of two treatment groups while participating in the 3-week spelling intervention (total of 15 days). Before the first day, students took a pretest and were administered the *Test of Written Spelling-4* (TWS-4) (Larsen & Hammill, & Moats, 2005). The purpose of the pretest and *TWS-4* was to identify students experiencing problems with spelling. During the three weeks, students were taught one of three different word types each week (regular words, morphemic words, and irregular words). On the 5^{th}, 10^{th}, and 15^{th} days of the intervention, students were tested on their ability to spell the particular word type that had been taught earlier

that week. Following the three weeks of intervention (15th day), students took the unit 3 test, and were also given a posttest. The next day (16th day), students took the Student Satisfaction Scale. Two weeks following the last instructional day (5th week), students took a maintenance test. Table 3 describes the timeline of the major events of the study.

Table 3

Timeline for Study

	Treatment days	Tests
	Preliminary	Pretest & TWS-4
Week 1	Day 1 (Monday)	Daily spelling instruction
	Day 2 (Tuesday)	Daily spelling instruction
	Day 3 (Wednesday)	Daily spelling instruction
	Day 4 (Thursday)	Daily spelling instruction
	Day 5 (Friday)	Weekly unit test 1 (regular words)
Week 2	Day 6 (Monday)	Daily spelling instruction
	Day 7 (Tuesday)	Daily spelling instruction
	Day 8 (Wednesday)	Daily spelling instruction
	Day 9 (Thursday)	Daily spelling instruction
	Day 10 (Friday)	Weekly unit test 2 (morphemic words)
Week 3	Day 11 (Monday)	Daily spelling instruction
	Day 12 (Tuesday)	Daily spelling instruction
	Day 13 (Wednesday)	Daily spelling instruction
	Day 14 (Thursday)	Daily spelling instruction
	Day 15 (Friday)	Weekly unit test 3 (irregular words) & posttest
Week 4	Day 16 (Monday)	Student Satisfaction Scale
Week 5	Two weeks later	Maintenance test

Methods and Procedures

To gain access to participants, a detailed, but brief research proposal was sent to a local school system for consideration (see Appendix A). Once administrators had granted permission and designated an approved school, the researcher then contacted the principal and provided him with information about the study (see Appendix A). Meetings with the principal, teachers and other personnel were scheduled so that an overview of the study could be presented. The presentation included suggested benefits to the school, and answered any questions or concerns the administration might have had. A letter of consent to parents (see Appendix A) was then distributed to all students identified as possible participants in the study. The letter explained the study, ensured confidentiality, and notified parents of their rights to disallow their children's participation at any time during the study. Parents were asked to provide written consent for their children to participate in the study (see Appendix A).

Students who returned consent forms were randomly assigned to one of two treatment groups. Random assignment was used to control for the effects of history, maturation, testing, and instrumentation (Stanley & Campbell, 1963). Students' names were drawn from a hat and placed into two stacks representing the two treatment groups.

Control for Extraneous Variables

Since this study was designed to compare the effects of two highly dissimilar approaches to spelling, several controls were implemented to ensure that extraneous variables were not the cause of any differences between the dependent measures. Some critical variables were held constant throughout all treatment groups. Described below are

the critical features for each group and the efforts that were made to control for their effects.

Features of instructional presentations were controlled for across both groups. First, instruction was limited to four times a week (Monday through Thursday) with a spelling test on Fridays for the three consecutive school weeks (total of 15 days). Adhering to typical elementary spelling lesson lengths, instructional sessions lasted around 20-25 minutes. Instruction was administered in small groups with no more than nine students per group. Second, the spelling words used in each of the treatments were identical and represented the three types of spelling patterns. Third, lessons for each of the treatment groups were semi-scripted. All semi-scripted lessons included the essential components of each lesson, including daily objectives, teacher wording, and lesson concept(s) or strategy. Scripted lesson plans allowed the researcher to be guided through the lessons, and ensured consistent implementation across groups.

Several efforts were made to control for possible teacher effects. The researcher taught both treatment and experimental groups. There are variables associated with how a teacher's actions could be probable confounding variables. Any effect the teacher had was equally distributed among all groups. In order to control for order effects, the teaching of two treatment groups were alternated.

Teacher Training

The researcher served as the teacher for all the intervention groups. The instructor has been a special education teacher for five years and has been thoroughly exposed to the DI methods. She has modeled and trained undergraduate and graduate students on the implementation of DI materials for three summer teaching clinics.

A trained doctoral student with a background in DI and nine years of experience teaching special education students served as the trained observer and critiqued the experimental teacher. This critique was done before the intervention began in order to provide feedback to improve instruction. The observation forms, "DI Checklist" and "Traditional Checklist" were used as guides. Features such as following instructional formats, signaling, pacing, error-correction, and reinforcement were emphasized. Behavior management focused on using positive verbal reinforcement. The trained observer assessed the implementation of both teaching methods throughout the intervention.

Fidelity of Treatment

To ensure fidelity of treatment, the teacher was visited and observed for at least 30% of the 12 sessions, over the duration of the study. Observations can be described as unobtrusive watching of behavior in a small group setting to ensure that teachers are implementing instruction correctly. The trained observer had a checklist to use for each lesson she observed. Checklists included length of lesson, students' time on task, implementation of lesson formats, pacing, and behavior management. These forms ensured that the two spelling instructional methods were administered appropriately (see Appendix B).

Independent Variables

The independent variables for this study were the method of spelling instruction. There were two levels of the independent variable: explicit rule-based instruction and traditional spelling instruction. Treatment groups differed only by critical instructional dimensions.

The traditional spelling instruction and explicit rule-based instruction descriptions that follow will vary. The traditional spelling instruction is described by its weekly components, whereas the explicit rule-based instruction is described using a typical daily lesson. The rationalization for this is due to the variations between the overall instructional goals of these methods. The traditional method focuses on a set of words taught Monday through Friday, with little or no cumulative review. Explicit rule-based instruction develops spelling skills daily with consistent review and teaching to mastery through a variety of activities. Explicit rule-based programs generally have an extensive scope and sequence lasting over longer periods of time.

Underlying Principles for the Explicit Rule-Based Approach

The explicit rule-based instructional group was modeled after the essential components of direct instruction (DI). Direct instruction is a model for teaching that stresses developed and pre-planned lessons designed around small learning increments and clearly defined teaching tasks. Direct instruction is based on the theory that clear instruction eliminates misinterpretations, which improves and accelerates learning (Ryder, Burton, & Silberg, 2006).

This theory is based on the work of Dr. Siegfried Engelmann and Dr. Wesley Becker. They believed that if direct instruction is implemented correctly, DI could improve the academic performance of students as well as decrease behavior problems. This was evidenced through Project Follow Through (1967), an educational experiment aimed at finding effective methods for educating disadvantaged children. The study provided a unique opportunity to study the effectiveness of a variety of educational methods. Project Follow Through was the largest formal experiment ever conducted on

educational practice and may be the largest study ever conducted on human subjects. The results of the project indicated that the direct instruction model provided instructional solutions to teaching disadvantaged children (Bock, Stebbins & Proper, 1977).

Direct instruction programs are designed around a specific teaching method, but also provide a systematic approach to teaching. This approach includes:

- Scripted lesson plans
- Rapid pace of instruction
- Immediate error correction
- Frequent assessment
- Teaching to mastery

Direct instruction has specific critical features. These features are designed to systematically promote teaching "the big picture" of instruction. Implementing this instruction to students requires clear communication, specific teacher wording, sequencing of examples, sequencing of preskills, and mastery of content over multiple lessons. All of these key features are implemented by: (a) instructional grouping (students grouped according to ability), (b) instructional time (increasing academic learning time), and, (c) continual assessment.

Direct instruction is designed to allow a high rate of teacher-student interaction. These interactions are demonstrated through: (a) students actively participating in lessons (multiple opportunities for students to respond and receive feedback); (b) unison responding; (c) teacher response signals (providing cues for students to respond); (d) pacing of instruction; (e) teaching to mastery; (f) error corrections (model, lead, test, retest); and (g) motivation (enhancing motivation through high levels of student success).

This method also includes instructional approaches for error correction, periodic review, with positive reinforcement all while being teacher-directed (Engelmann & Carnine, 1991).

Scientific Research Associates (SRA) DI program *Spelling Mastery* is based on the essential DI components. This program teaches students spelling skills by blending the three spelling approaches (phonemic, morphemic and whole-word approach). A composite of these three approaches provides straightforward lessons to help teach students to become proficient spellers and proficient writers (Dixon & Engelmann, 1999).

Model Lesson of the Explicit Rule-Based Approach

The focus of the *Spelling Mastery* program is to teach spelling to high levels of mastery. A typical lesson in *Spelling Mastery* generally consists of six exercises.

Exercise 1. Students work on orally identifying sounds that compose words. This can be long or short vowel sounds, blends, or whole words.

Exercise 2. Students review previously taught phonemic generalizations (rules or sounds). For example, the sound /a/ is spelled *–ay* when it comes at the end of a word (day, play, stray). Practice allows for students to become automatic in their spelling.

Exercise 3. Students write two to three sentences from dictation. Sentences are made up only from words that have been previously taught. This exercise allows for a review of words, while modeling for different ways in which words can be used.

Exercise 4. A pair of commonly confused words are taught in the same sentence (where and were). Prompts are provided in order to prevent confusion among the words.

Exercise 5. Sets of five to eight words previously taught are dictated. This is a review and provides practice.

Exercise 6. Students are provided a picture and are asked to write a sentence that tells what the characters could be saying. This allows for transfer of words from practice into sentence writing. Students are encouraged to use previous words to compose their sentences. A sample lesson plan of the explicit rule-based strategy can be found in Appendix C.

Underlying Principles for the Traditional Instructional Approach

The other treatment group in this study was the traditional approach based on a composite of several basal spelling series. Just as in the explicit rule-based approach, the lessons in the traditional approach were semi-scripted so the experimental teacher could follow the program just as the authors have intended. The instructional methods typically found in popular basal programs currently used in many schools were utilized. In general, these programs are designed to integrate spelling skills with everyday language arts skills. This is incorporated through a variety of activities (e.g., rhyming words, puzzles, find the misspelled word, vocabulary builders) that can be linked to other content areas. Furthermore, students are prompted to check their spelling and grammar, and are encouraged to use dictionaries and spell checkers for clarification.

According to Fresch (2003), the three most widely used spelling programs are Addison Wesley's *Everyday Spelling*, Steck-Vaughn's *Target Spelling*, and the Harcourt Brace Javanovich program, *Spelling* (HBJ). Although these programs vary slightly, the lessons generally allow for students to work and think independently while learning to spell.

Critical to these programs are word selection. These programs base word lists on the 100 most frequently used words and the 100 most frequently misspelled words as

reported by Research in Action (Cramer & Cipielewski, 1995). Students should be taught frequently misspelled words from their writing. Research in Action showed that students' misspelled words can often be predicted, these words should be, "…retaught, reviewed, and recycled throughout several grade levels" (Beers, Cramer, & Hammond, 2000). To provide consistent review, hints and tips within each lesson focus the students' attention to those frequently misspelled words.

The Steck-Vaughn *Target Spelling* series is focused on individual learning styles and purports to work well with struggling spellers. This program allows for flexibility in instruction to address specific needs of spellers. Real-world practice spelling and linking word meaning is pivotal to the program. Lessons provide a variety of assessments. Steck-Vaughn bases their programs on two types of research: effectiveness studies and technical reports. The effectiveness studies were used to substantiate the efficacy of their programs. Foundational research is based on experimental and quasi-experimental research that shapes their products (Pescosolido, 1984).

A typical traditional lesson plan includes words that are frequently misspelled, introduces spelling strategies, provides weekly vocabulary and writing activities, and provides learning opportunities for the visual, auditory and kinesthetic learner. Students are also provided opportunities to write creative stories using their spelling words. *Everyday Spelling* by Addison-Wesley is a combination of the two programs that adequately represents the traditional basal programs currently being taught.

Model Lesson of the Traditional Instructional Approach

Traditional spelling lessons are designed to last from Monday to Thursday with instruction varying each day. These programs describe the test-study-test method as the

single most effective strategy for teaching spelling. Once students have seen their spelling words for the week, they take over responsibility for their own learning. Table 4 below depicts a typical weekly unit layout.

Table 4

Weekly Schedule of a Traditional Spelling Lesson

Monday	Tuesday	Wednesday	Thursday	Friday
• Pretest • Lesson and word introduction	• Introduce cross curricular vocabulary • Think and practice	• Proofreading and writing	• Vocabulary building • Review	• Test

A detailed description of the traditional spelling lesson follows. This description elaborates on daily instructional features.

Monday: Pretest and Lesson Introduction. Spelling lessons begin by giving a pretest. The pretest is a metacognitive strategy that focuses attention on missed words. Self-correction of the pretest allows students to understand generalizations, discover which words are difficult, locate troublesome parts of words, and individualize their goal for the week. During the pretest, students are to read aloud a list of words, write the words, and place a question mark next to the words they think are incorrect. Teachers then read each word and spell it aloud, while students correct their work.

Tuesday: Think and Practice. Students are introduced to spelling strategies for the week. Students are then assigned their words to study for the posttest. Instruction is then catered to meet the needs of all students. Some students will do better with an increase or decrease in words on their lists. It is at the teachers' discretion which words to include. Some activities include sequencing, problem parts, memory tricks, meaning helpers, word finds, and misspelled words.

Wednesday and Thursday: Proofreading, Writing, Vocabulary and Review. Students are encouraged to use words they are learning to spell in both writing and proofreading activities. Other activities also focus on vocabulary building and multi-meaning words. Lesson reviews emphasize the students' ability to generalize their words into writing context. This review allows for teachers to check and evaluate student knowledge before the posttest.

Friday: Posttest. During the posttest, teachers read aloud their list of words, while students write their words on paper. Sentences containing the words should have been taught previously in the week. Teachers can also make a standardized test master for students to take individual tests. An example of a traditional spelling lesson and sample student worksheet can be found in Appendix C.

Selection of Spelling Words

Words for the pretest were randomly chosen from the "100 Most Frequently Misspelled Words" list and from the master word lists of traditional spellers. Thirty words from each of the three word types (regular, morphemic, and irregular) were the framework of the pretest. Therefore, the pretest had a total of 90 words.

Sixty words from the pretest were taught for the 3-week intervention, allowing for 20 words per week. This is based on the typical amount of words introduced per week in traditional programs. During the first week of intervention, phonetically regular words were taught. Words that contain letter combinations such as *oa*, *ai*, or *ea*. Words consisted of four to nine letters following a CVVC pattern. During the second week, words that required morphemic analysis were taught (prefixes or suffixes). For instance, the word *unable*, is formed by adding the prefix *un-* to the base word *able*. Words also

consisted of other morphemes such as *re-*,*-ed*, or *pre-*. The third and final week of words were composed of irregular words. Irregular words have letters or letter combinations that do not represent their most common sounds (e.g., *was, all, draw,* and *of*). At the end of the third week, the posttest was administered.

Dependent Measures

As mentioned earlier, the six dependent measures were: (a) pretest, (b) three weekly unit tests, (c) posttest, (d) *TWS-4* standardized spelling test, (e) Student Satisfaction Scale and (f) maintenance test.

Pretest

A pretest was given before the intervention in order to establish the student's present level of performance. The 90 word pretest consisted of 30 words from each of the three word types. Word lists were randomly constructed from the "100 Most Frequently Used Words" and "The 100 Most Frequently Misspelled Words" as reported by Research in Action (Cramer & Cipielewski, 1995).

Three Weekly Unit Tests

After every fourth lesson (on the 5^{th}, 10^{th} and 15^{th} day) a 20-word item test was dictated to the subjects in both groups. The purpose of the unit tests was to evaluate the participants' ability to spell words that were specifically presented in the groups. Students were given paper and instructed to number and write their spelling words as they were read aloud. If a student asked for help, they were reminded to use the skills they had been taught during the week. However, rate of word presentation was slowed when necessary.

Posttest

On the last day of intervention (15th day) students were administered a posttest in order to establish the student's present level of performance. The 90 word posttest consisted of the same words on the pretest (30 words from each of the three word types). The words were presented in the same order as in the pretest. The posttest was administered in the same manner as the unit tests.

Test of Written Spelling-4 (TWS-4)

The *TWS-4* was administered during the pretest. The *TWS-4* is a standardized achievement test for measuring spelling achievement. This test was standardized on more than 4,000 students. Internal consistency and test-retest reliability coefficients are greater than .90. There is also support for construct, content, and criterion-related validity on the *TWS-4* (DeMauro, 1999). The test yields information such as standard scores, percentiles, spelling age, and grade equivalents. The *TWS-4* has four purposes, one of which is to identify students whose scores are significantly below those of their peers and who might benefit from interventions designed to improve spelling proficiency (Larsen, Hammill & Moats, 2005).

Student Satisfaction Scale

After the last day of intervention (15th day), a Student Satisfaction Scale was administered (see Appendix B). This survey measured students' attitudes toward spelling and their sense of efficacy as spellers. This scale was adapted from a similar survey used in an instructional study on mathematics (Hollis, 1998). The questionnaire was submitted to a panel of eight peers for review and consensus to establish face validity. The researcher reviewed the suggestions from the panel of peers in order to revise the

instrument. Once the instrument was revised, two professionals were provided an opportunity to review the instrument for clarity, relevance, importance, and to offer further suggestions. The final survey was then constructed. No reliability measures were available since the survey was unique to this particular study.

This survey had a three point Likert-type scale containing ten statements that probed the students' thoughts about their spelling and instruction preferences. An example of a statement within the survey is, "I avoid spelling whenever I can", or "I would rather do math than spelling." Students were asked to be honest and mark the appropriate number on the scale for each item. Confidentially was ensured, and one example of how to mark the survey was provided.

Maintenance Test

The maintenance test was given two weeks after the last day of intervention (week five). This test included seven words representing each of the three word types, for a total of 21 words. Words were randomly chosen from the three unit tests.

Data Analysis

Pretest data and the *TWS-4* were first examined to determine whether there were significant differences between the two treatment groups using an independent samples *t*-test. The purpose of this analysis was to determine if there were any significant differences between the groups on standardized scores related to spelling achievement. Group differences were also examined for age, sex, gender, disability type, and grade for both groups.

A 2x3 factorial mixed method ANOVA was used to examine differences between and among the groups. The two levels of the independent variables were the instructional types: explicit rule-based and traditional. The three levels of the independent variables were the scores (percent correct) on the three weekly unit tests (regular, irregular and morphographic word type).

Differences between the mean test scores of the two treatment groups were compared on (a) three weekly unit tests, (b) maintenance test, (c) TWS-4, (d) pretest/posttest, and (e) Student Satisfaction Scale. The Student Satisfaction Scale was analyzed using an independent samples *t*-test.

A .05 alpha level of significance was used. The Wilks' Lambda test of significance was set at the .05 level. Multivariate results were used due to spherificity assumptions. All data were analyzed using Statistical Package for Social Sciences (SPSS) version 14. SPSS is a widely used computerized statistical package.

Error Analysis

The following types of errors were recorded and analyzed: (a) orthographic errors, (b) phonological errors, (c) sequence errors, (d) substitution errors, or (e) gross errors (Gettinger, Bryant, & Fayne, 1982). The average number of errors by type were calculated for the three unit tests and maintenance test to establish differences, if any, between the two groups. Simple comparisons of these figures were made and recorded.

Scoring the Data

Quantitative data were scored by students' performance on unit tests, transfer tests and maintenance tests. Subjects received either a 1 (correct) or a 0 (incorrect) for each spelled item. Words were marked wrong if they had substitutions, deletions, or incorrect

sequencing. Dividing the number of correct words by the total number of words and multiplying it by 100 was used to measure the percent correct on each test.

Null Hypotheses

The general research questions in this study were: (a) Are there specific methods of teaching spelling that are more successful to students with mild learning and behavior problems?, (b) Are there specific methods of teaching spelling that are more successful at promoting skill retention for students with mild learning and behavior problems?, and (c) What are student attitudes towards a particular spelling approach? These general questions were answered through the specified null hypotheses.

The null hypotheses for this study included the two levels of the independent variable and the six dependent measures. The two methods of spelling (explicit rule-based versus traditional group) served as the independent variables. As mentioned earlier, the six dependent measures include: (a) pretest, (b) three weekly unit tests, (c) posttest, (d) *TWS-4*, (e) maintenance test, and (f) a Student Satisfaction Scale. Outlined below are the six null hypotheses that were tested.

Prestest

$H\emptyset_1$: There is no significant difference between treatment groups on pretest scores (90 words).

Three unit tests

$H\emptyset_2$: There is no significant difference between treatment groups on the three weekly tests (20 words per test).

Posttest measure

$H\emptyset_3$: There is no significant difference between treatment groups on the posttest measure (90 words).

TWS-4 Measures

$H\emptyset_4$: There is no significant difference between treatment groups on the *TWS-4.*

Maintenance measures

$H\emptyset_5$: There is no significant difference between treatment groups on the maintenance test.

Qualitative measures

$H\emptyset_6$: There is no significant difference between treatment groups on the overall Students' Satisfaction Scale.

Summary

This chapter provided a detailed description of the research methodology used in this study. Procedures for the sample selection and data collection were outlined. A description of the independent variables and dependent measures was presented. A rationale for each instructional type was described. Finally, the methods of data analysis and a list of the six null hypotheses to be tested concluded the chapter.

IV. RESULTS

This chapter presents the results of the data analysis for this study. First, a general description of the sample will be given. Second, descriptive statistics of the traditional and explicit rule-based group along with the results of their performance on the pretest and *TWS-4* will be presented. Next, the research questions, hypotheses, and results of the statistical analysis will follow each question. Finally, details of the qualitative data (Student Satisfaction Scale) and student error analysis will be presented. The chapter will conclude with an analysis of the informal interviews.

Descriptive Statistics of the Sample

Participants (n = 41) in the study were third through fifth grade students with mild learning and behavior problems from an inner city Southeast Alabama elementary school. Twenty-seven subjects were male (66%) and 14 were female (34%). Participants were placed in one of the four appropriate ethnic categories of the study: African-American, Caucasian, Hispanic, and Other. The largest ethnic group in the study was African-Americans, which was 63% of the sample. Twenty-four percent of the sample was composed of Other (Pacific Islander, Bi-racial, Asian, American Indian). The two smaller groups of the sample were Caucasians (7%) and Hispanics (5%).

The age of the participants ranged from 102 months (8 years old) to 146 months (12 years old), with an average age of 120 months (10 years old). The largest age group

of the study consisted of nine year olds (37%), followed by eleven year olds (27%) and ten year olds with 20%. Eight year olds made up fifteen percent of the subjects. Only one twelve year old participated in the study. Fifteen students (37%) were classified as having a disability and twenty-six students (63%) were considered to be at-risk for failing. These students were classified as at-risk because they either qualified for Title I services, or scored in the strategic or intensive categories on DIBELS. Table 5 presents the method of instruction, gender, exceptionality, grade, and ethnicity.

Table 5

Subjects' Demographic Information

Characteristics		N
Method of instruction		
	Traditional	21
	Explicit rule-based	20
Gender		
	Male	27
	Female	14
Exceptionality		
	At-risk	26
	SPED	15

(table continues)

Table 5 (continued)

Characteristics		N
Grade		
	3rd grade	12
	4th grade	18
	5th grade	11
Ethnicity		
	African American	26
	Caucasian	3
	Hispanic	2
	Other	10

Data were first examined to determine whether there were significant differences between the traditional group and the explicit rule-based group. Table 6 reports the gender, exceptionality, ethnicity, grade, and assessment scores of the sample. A one-way analysis of variance revealed that there were no significant differences between the groups in gender, ethnicity, age, exceptionality, and assessment (spelling achievement) ($F = 1.969$, $p > .169$). Tests for significance were set at the .05 alpha level.

Table 6

Subject Demographics by Intervention Group

Traditional Method (n = 21)		Explicit Rule-based Method (n = 20)	
Characteristics	*N*	Characteristics	*N*
Gender		Gender	
Male	15	Male	12
Female	6	Female	8
Exceptionality		Exceptionality	
At-risk	12	At-risk	14
SPED	9	SPED	6
Ethnicity		Ethnicity	
African American	10	African American	16
Caucasian	2	Caucasian	1
Hispanic	2	Hispanic	0
Other	7	Other	3
Grade		Grade	
3rd grade	0	3rd grade	12
4th grade	15	4th grade	3
5th grade	6	5th grade	5

(table continues)

Table 6 (continued)

Traditional Method (n = 21)			Explicit Rule-based Method (n = 20)		
Assessments	SD	*M*	Assessments	SD	*M*
Pretest	16.79	43.9	Pretest	13.58	47.8
TWS-4	13.57	83.4	*TWS-4*	10.14	88.7

M = mean

SD = standard deviation

From the original 51 students who returned completed consent forms, 10 students were not included in the final analysis. One student moved to another school district, three students were assigned to an alternative school because of behavior problems, four students scored higher than 60% on the pretest, and three students were dropped because of absenteeism. Six of these students were from third grade classrooms. Teacher observations from the trained observer yielded an 86% average for three lesson observations of the traditional group, and a 91% average for the three lesson observations of the explicit rule-based group.

Research Questions, Hypotheses, and Statistical Analysis

The data analyzed in this study were the participants' performance on: (a) pretest, (b) 3 weekly unit tests, (c) *Test of Written Spelling- 4* (*TWS-4*), (d) posttest, (e) maintenance test, and (f) Student Satisfaction Scale. All data were analyzed using SPSS, a computerized statistical package. Following are the null hypotheses with the results of the independent samples *t*-test. Null hypotheses 1, 3, 4, 5, and 6 were analyzed by

independent samples *t*-test. Hypothesis 2 was analyzed by using 2 by 3 mixed method analysis of variance (ANOVA).

Research Question 1

$H\emptyset_1$: There is no significant difference between treatment groups on pretest scores.

Null hypothesis one was not rejected. An independent samples *t-test* compared the mean pretest score for the traditional group (M = 43.90, SD = 16.79) with the explicit rule-based group (M = 47.85, SD = 13.59). This comparison was not statistically significant, t = -.824, p>.05. Table 7 represents these findings.

Table 7

T-Test Results for the Pretest Scores for the Traditional and Explicit Rule-Based Group

Method	Mean	SD	df	*t*	*P*	η^2
Traditional (n = 21)	43.90	16.79	20	-.824	.138	.63
Explicit Rule-Based (n = 20)	47.85	13.59	19			

SD = standard deviation

df = degrees of freedom

Research Question 2

$H\emptyset_2$: There is no significant difference between treatment groups on the three weekly tests.

Null hypothesis two was not rejected. The three weekly unit tests were analyzed by means of a 2 by 3 mixed design analysis of variance (ANOVA) having two levels of instruction (traditional and explicit rule-based) as a between-subjects factors and the three

weekly unit tests (regular, morphemic, and irregular words) as within-subjects factors. The interaction effect of instructional method by unit tests was not significant, $F(1, 35) = 2.141$, $p > .05$. The within-subjects main effect of the three weekly unit tests (Greenhouse-Geisser) was also not statistically significant, $F(2,35) = 74.54$, $p < .000$, partial $\eta^2 = 68$. The explicit rule-based group showed higher mean scores on all three unit tests (regular words $M = 84.71$, SD = 17.45, morphographic words $M = 54.41$, $SD = 23.37$, and irregular words $M = 58.53$, $SD = 17.74$) compared to the traditional method. The explicit rule-based group mean ($M = 58.53$, $SD = 17.74$) was highest for unit test three (irregular words) compared to the traditional group ($M = 43.25$, $SD = 27.44$). The multivariate Wilks' Lamba test for treatment was significant ($F = 93.715$, df = 2,37, $p < .05$). These results indicate that all students increased in their spelling performance, regardless of instructional type. Table 8 presents means, standard deviations for the three levels of the dependent variable, F Values, P Values, and Eta Squared Scores.

Table 8

2 X 3 Mixed Method ANOVA Results by Levels of the Dependent Variable for the Traditional and Explicit Rule-Based Group

Method	Mean	SD
Unit test 1 (regular words)		
Traditional (n = 20)	78.50	25.13
Explicit rule-based (n = 17)	84.71	17.45
Unit test 2 (morphographic words)		
Traditional (n = 20)	45.50	25.64
Explicit rule-based (n = 17)	54.41	23.37
Unit test 3 (irregular words)		
Traditional (n = 20)	43.25	27.44
Explicit rule-based (n = 17)	58.53	17.74

Measure	*F*	*P*	η^2
Within Subjects Effects			
Treatment	74.54	.000	.680
Treatment X Group	1.25	.292	.034
Between Subjects Effects	2.141	.152	.058

SD = standard deviation

Research Question 3

$H\emptyset_3$: There is no significant difference between treatment groups on the posttest measure.

Null hypothesis three was not rejected. An independent samples *t-test* compared the mean posttest score for the traditional group (M = 62.19, SD = 23.72) with the explicit rule-based group (M = 71.40, SD = 20.30). This comparison was not statistically significant, t = -1.332, $p > .05$. This information is also represented in Table 9 for the posttest measure.

Table 9

T-Test Results for the Posttest for the Traditional and Explicit Rule-Based Group

Posttest	Mean	SD	df	*t*	*P*	η^2
Traditional (n = 21)	62.19	23.72	20	-1.1332	.237	.03
Explicit rule-based (n = 20)	71.40	20.30	19			

SD= standard deviation

df= degrees of freedom

Research Question 4

$H\emptyset_4$: There is no significant difference between treatment groups on the *TWS-4.*

Null hypothesis four was not rejected. An independent samples *t* test compared the mean *TWS-4* scores for the traditional group (M = 43.90, SD = 16.79) with the

explicit rule-based group (M = 47.85, SD = 13.58). This comparison was not statistically significant, t = -.824, p > .05. These findings are represented back in Table 6.

Research Question 5

$H\emptyset_5$: There is no significant difference between treatment groups on the maintenance test.

Null hypothesis five was not rejected. An independent samples t test compared the maintenance test scores for the traditional group (M = 59.90, SD = 19.67) with the explicit rule-based group (M = 61.74, SD = 15.88). This comparison was not statistically significant (t = -.322, p > .05). Table 10 represents these findings.

Table 10

T-test Results for the Maintenance Test for the Traditional and Explicit Rule-Based Method

Maintenance Test	Mean	SD	df	*t*	*P*	η^2
Traditional (n = 21)	59.90	19.67	20	-.322	.439	.002
Explicit rule-based (n = 19)	61.74	15.88	18			

SD = standard deviation

df = degrees of freedom

Research Question 6

$H\emptyset_6$: There is no significant difference between treatment groups on the overall Students Satisfaction Scale.

Null hypothesis six was not rejected. This indicated that there were no significant differences between the two treatment groups on the (overall) Student Satisfaction Scale. Students marked either a 1 for “agree,” 2 for “somewhat agree,” and a 3 for “disagree.” Lower mean scores indicate agreement with the corresponding statement on the Student Satisfaction Scale.

Survey question 1 (I like spelling) was the only statement to show significance ($p > .04$). This suggests that all students regardless of instructional group, enjoyed spelling. The means, standard deviations, degrees of freedom, t values, and p values of the independent samples t-test on each of the Student Satisfaction Scale statements are presented in Table 11.

Table 11

Means, Standard Deviations, Degrees of Freedom, T Values, and P Values for the Student Satisfaction Scale for the Traditional and Explicit Rule-Based Method

Variable	Mean[a]	SD	df	*t*	Significance
1. I like spelling			39	2.127	p > .04
Traditional Method	2.19	.814			
Explicit Rule-Based Method	1.65	.813			
2. I would rather do math than spelling			39	-1.572	p < .124
Traditional Method	1.76	.944			
Explicit Rule-Based Method	2.20	.834			
3. I avoid spelling when I can			39	-.201	p < .842
Traditional Method	2.19	.981			
Explicit Rule-Based Method	2.25	.910			

(table continues)

Table 11 (continued)

Variable	Mean[a]	SD	df	*t*	Significance
4. I learned new ways to spell			39	.790	p < .434
Traditional Method	1.76	.889			
Explicit Rule-Based Method	1.50	.826			
5. I can correct my spelling mistakes			39	.658	p<.515
Traditional Method	1.67	.796			
Explicit Rule-Based Method	1.50	.827			
6. I like how the teacher taught spelling me spelling			39	-.647	p<.521
Traditional Method	1.19	.512			
Explicit Rule-Based Method	1.30	.571			
7. I will be a better speller in the future			39	.070	p<.945
Traditional Method	1.62	.921			
Explicit Rule-Based Method	1.60	.821			

(table continues)

Table 11 (continued)

Variable	Mean[a]	SD	df	*t*	Significance
8. Spelling is easy for me			39	.612	p<.544
Traditional Method	1.90	.831			
Explicit Rule-Based Method	1.75	.786			
9. I am a better speller			39	.433	p<.660
Traditional Method	2.14	.727			
Explicit Rule-Based Method	2.05	.605			
10. I wish I was taught this way everyday			39	-.744	p<.461
Traditional Method	1.48	.680			
Explicit Rule-Based Method	1.65	.813			

SD = standard deviation

df = degrees of freedom

[a]1 = agree, 2 = somewhat agree, 3 = disagree

Error Analysis

The percentage of error types on the three weekly unit tests and maintenance test were analyzed to ascertain differences between treatment groups. The following five types of errors were recorded and analyzed:

1. Substitution errors—The error includes an incorrect placement of a digraph.
2. Orthographic errors—The error is phonetically correct but orthographically incorrect (i.e., cote for coat).
3. Phonological errors—The error includes one or more grapheme mistake that changes a word (i.e., barn for born).
4. Sequence errors—The error includes an incorrect order of two graphemes (i.e., baot for boat).
5. Gross errors—The error does not represent either correct orthographic or phonological presentation of the word (i.e., cote for soap).

The results of spelling errors indicated that the effects of the treatments on error types differed according to instructional method. The explicit rule-based group made fewer total errors on all five-error types compared to the traditional group. The largest difference in scores was seen during Weekly Unit Test 3 (Irregular words) with 228 errors (traditional group) and 142 errors (explicit rule-based group). Errors on the Maintenance Test were similar between the two treatment groups (164 and 133). Table 12 presents the number of errors and total possible correct responses with percentages for the three weekly unit tests and maintenance test for the traditional and explicit rule-based group.

Table 12

Total Errors and Total Possible Correct Responses for the Three Weekly Unit Tests and Maintenance Test for the Traditional and Explicit Rule-Based Group

Measure	Total Errors Traditional Group	Total Errors Explicit Rule-Based Group
Unit Test 1(regular words)	88/400 (22%)	54/340 (16%)
Unit Test 2 (morphemic words)	220/400 (55%)	156/340 (46%)
Unit Test 3 (irregular words)	228/400 (57%)	142/340 (42%)
Maintenance Test	164/400 (41%)	133/340 (40%)

On Weekly Unit Test 1, the traditional group made more substitution errors and phonological errors than the explicit rule-based group. Groups made similar errors in sequence and gross errors. During Weekly Unit test 2, the traditional group made more substitution errors and more gross errors than the explicit rule-based group. The explicit rule-based group made more phonological errors and orthographic errors than the traditional group. Both groups were comparable in sequence errors. Unit Test 3 yielded higher errors for the traditional group all types except gross errors. On the maintenance measure, both groups were comparable with no more than a two or three percent difference in all categories.

Table 13

Percentages of Spelling Error Type for the Traditional Method and Explicit Rule-Based Method on the Three Weekly Unit Tests and Maintenance Test

Error Type	Weekly Unit Test 1 (Regular words)	Weekly Unit Test 2 (Morphemic words)	Weekly Unit Test 3 (Irregular words)	Maintenance Test
Substitution Errors				
Traditional Method	5%	14%	6%	4%
Explicit Rule-Based Method	2%	5%	5%	4%
Orthographic Errors				
Traditional Method	6%	8%	17%	5%
Explicit Rule-Based Method	6%	16%	14%	3%

(table continues)

Table 13 (continued)

Error Type	Weekly Unit Test 1 (Regular words)	Weekly Unit Test 2 (Morphemic words)	Weekly Unit Test 3 (Irregular words)	Maintenance Test
Phonological Errors				
Traditional Method	9%	11%	6%	16%
Explicit Rule-Based Method	5%	28%	1%	13%
Sequence Errors				
Traditional Method	0%	4%	8%	9%
Explicit Rule-Based Method	1%	1%	1%	7%
Gross Errors				
Traditional Method	0%	10%	11%	3%
Explicit Rule-Based Method	1%	2%	17%	5%

Student Interviews

Two students (one special education student and one at-risk student) from each grade level were randomly selected for informal interviews (n = 6). Overall, responses to interview questions were all similar except for interview question three. Student responses are listed below by each interview question:

1. *What makes somebody a good speller?*
    - "When you try real hard. Especially hard words."
    - "Practice for about 30 minutes."
    - "Pay attention to your words."
    - "Copy them every night."
    - "Memorize them."
    - "Write them well…write them neat."

When asked interview question 1, students did not respond with any type of effective spelling strategy (cover-copy-compare, sounding out, etc.). Students mostly referred to ineffective strategies.

2. *When you don't know how to spell a word, what do you do to try and spell it?*
    - "I sound it out or skip it."
    - "Sound it out."
    - "I find a dictionary. My teacher doesn't tell us how to spell a word."
    - "Ask somebody…maybe sound it out."
    - "Ask for help…my teacher will tell me."

When asked interview question 2, two of the students responded with the sounding out strategy. Others relied on extraneous resources such as teacher, peer, or

dictionary. Both students who responded with “sound it out” were in the traditional group.

3. *Do you like how I taught you spelling? Why or why not?*
    - “I can pass my grades. I don’t struggle that much”
    - “Yes, because you used the words in a sentence”
    - “Yes, cause you didn’t hurry us up. I could always finish my work.”
    - “Yes, cause I could hear you say them everyday. I didn’t know what we would be doing everyday. We didn’t have to put them in ABC order or nothing.”
    - “Yes, because you would say it, and then we would say it. I like it when you spell it out loud and we have to tell you the word. That was fun.”
    - “It was o.k. It was work”

When asked interview question 3, three of the students in the explicit rule-based group made reference to instructional features within the lesson. Features such as pacing (I could finish my work), variety of spelling activities (didn’t know what we would be doing everyday), saying the words out loud everyday, and spelling the word out loud and having students say the word. However, the last comment, “It was o.k. It was work,” was made by an explicit rule-based group student. This was surprising considering the explicit rule-based instructional features tend have a variety of activities.

4. *Have you used your new spelling skills in another subject?*
    - “Yes, cause I got a B cause I used it. Sounding it out”
    - “No”
    - “In my DOL, we had words that we had to add –s or –es to.”

- "Maybe, maybe in Language, I tried to use some of my words in Language."
- "No. I don't think so."

When asked interview question 4, only one student responded to using his new spelling skills in another subject. However, lessons during the intervention did not teach adding –es or –s to new words.

5. *How do you feel when you can't spell a word?*
    - "Mad. Actin' bad. I put it in my desk cause it gets on my nerves and I won't do it."
    - "Sad and nervous cause I can't keep up. I put my head down and look around to see if anyone notices. But they don't really cause I sit by myself in front of the wall."
    - "Like I'm a bad speller. But I'm a good speller."
    - "No kind of way. I just try and leave it."
    - "I just ask."

When asked interview question 5, most students responded with the feeling of mad or sad. Two students' responded with a type of avoidance behavior or hiding their work. Students seemed reluctant to answer question five and would generally look away from the researcher. This type of behavior was not seen during the other four interview questions.

Summary

An independent samples *t*-test on the subjects' performance were analyzed and presented in this chapter for: (a) pretest, (b) 3 weekly unit tests, (c) *Test of Written Spelling- 4* (*TWS-4*), (d) posttest, (e) Maintenance Test, and (f) Student Satisfaction Scale. The results of these analyses were reported for the six null hypotheses. Although there were no significant differences between the traditional group and explicit rule-based group on all the dependent measures, both groups did increase in their overall spelling skills.

This chapter provided a comprehensive examination of the results of the study. Overviews and descriptive statistics of the research sample and intervention groups were described. Analyses of the six hypotheses were presented in detail. The result of the Student Satisfaction Scale was also analyzed. Next, the subjects' spelling errors were analyzed among the groups. The chapter concluded with the responses to 5 interview questions. The next chapter will discuss these results. Conclusions and recommendations for future research will also be discussed.

V. RESULTS AND DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

This chapter will provide an overview of the results of the study. A discussion of the research findings and why these findings may not relate to the current literature on spelling interventions for students with mild learning and behavior problems will follow. The chapter will conclude with dialogue about limitations of the study and recommendations for future research.

The purpose of this study was to examine the effects of two instructional procedures for teaching elementary students with mild learning and behavior problems to spell. Overall, there were three specific questions the researcher wanted to investigate: (a) Are there specific methods that are more effective in improving the spelling performance for students with mild learning and behavior problems? (b) Are there specific methods that are more effective for students maintaining their spelling knowledge? and (c) Do students with mild learning and behavior problems have a preference towards certain types of spelling instruction?

A large body of empirical data related to spelling instruction in regular education exists; however, little attention has been paid to investigating the effectiveness of these programs when being used in the classrooms of students with learning and behavior problems (Vaughn, Schumm, & Gordon, 1992). Spelling is a highly complex process and

is often characterized as an area of difficulty for students with LD (Carpenter & Miller, 1982; Kirk & Elkins, 1975).

Research has shown that students with mild behavior and learning difficulties have frequent questions when spelling and have greater difficulty with writing than their normally achieving peers. Generally, students with LD have more problems producing writing that is polished, expansive and coherent than students without disabilities (Harris & Graham, 1999). A study by McKinney and Feagans (1984) implies that the majority of students with a learning disability experience most of their academic difficulty in the areas of reading, writing and spelling. Wertz, Gardner, Weber, and Bullara (1996) suggest that inadequate commercial spelling texts, a lack of individualized instruction, and the use of traditional spelling procedures over programs and techniques that have an empirical research base as reasons for poor spelling achievement.

In the present study, 41 students from an inner city elementary school in Southeast Alabama with mild learning and behavior problems were randomly assigned to either the traditional or explicit rule-based group. Daily instructional sessions lasted 20-25 minutes for a total of three weeks. The researcher served as the experimental teacher and was observed 30% of the time to ensure that instructional features were enacted. No behavior problems occurred throughout the duration of the study. Every effort was made to ensure differences in spelling performance were due to instructional features.

Before the intervention began, the researcher gave students a pretest and the *TWS-4* to ensure equality among groups. During each spelling lesson, the researcher adhered to the semi-scripted lessons for each instructional type. On the fifth, tenth, and fifteenth day of the intervention, weekly unit tests were administered for both instructional groups

(total of three weekly unit tests). The three weekly unit tests were used to assess student performance on spelling words from that week's lesson. Students took a posttest and completed the Student Satisfaction Scale following the last day of intervention. The purpose of the survey was to determine if there were differences between the two treatment groups' overall attitude toward spelling or preference for instructional type. Two weeks later, a maintenance test was administered. The maintenance test consisted of 30 words to determine if students had maintained spelling skills previously taught. This test consisted of 10 words randomly selected from each word type during the 15 day intervention. Informal interviews were also conducted during this time. The experiment took a total of six weeks to complete.

Results and Discussion

Results of this study indicated that there were no significant differences between the two treatment groups on the pretest and *TWS-4*. Analyses of the three weekly unit tests, posttest, and maintenance test failed to find significant differences between the two treatment groups. However, all participants improved in their spelling performance irrespective of treatment group. The Student Satisfaction Scale also failed to find significant attitudinal differences between the two treatment groups; subjects liked the way they were taught spelling and considered themselves good spellers. A detailed description of the results is presented below.

Pretest

The results of an independent samples *t*-test revealed that the mean pretest score for the traditional group was 44% while the explicit rule-based group had a mean of 48%

(see Table 3). None of the groups scored above 60% for either treatment group (considered below average based on the typical letter grading scale). Although the explicit rule-based group had a slightly higher average than the traditional group, this difference was not statistically significant. The pretest was utilized to determine equivalences among treatment groups at the onset of intervention.

Unit Tests

The three weekly unit tests were analyzed by means of a 2 by 3 mixed design analysis of variance (ANOVA) having two levels of instruction (traditional and explicit rule-based) as a between-subjects factors and the three weekly unit tests (regular, morphemic, and irregular words) as within-subjects factors. The interaction effect of instructional method by unit tests was found to not be statistically significant. The within-subjects main effect of the three weekly unit tests (Greenhouse-Geisser) was reported to be 68%.

The explicit rule-based group outperformed the traditional group on all three unit tests (based on percent correct). For regular words, the explicit rule-based group had a mean of 85% compared to the traditional group mean of 79%. For morphographic words, the explicit rule-based group had a mean of 54% compared to 46% average of the traditional group. Weekly unit test 3 of irregular words yielded a mean of 58.53% for the explicit rule-based group and 43.25% for the traditional group. The explicit rule-based group mean differences (58.53%) were highest for unit test three (irregular words) compared to the traditional group (43.25%). The multivariate Wilks' Lambda test for treatment was significant ($F = 93.715$, df = 2,37, $p < .05$). Results appears to suggest that features within the traditional method and explicit rule-based method are both effective in

teaching students with mild learning and behavior problems to spell. Interestingly, when comparing the standard deviations between the two groups on the weekly unit tests, the explicit rule-based group as a whole had better scores. There may have been some instructional features within the explicit rule-based group that caused the group as a whole to perform better (refer to Table 4).

Since most students with mild learning and behavior problems have difficulty with spelling (Vaughn, Schumm, & Gordon, 1992; Carpenter & Miller, 1982; Kirk & Elkins, 1975) it is essential to study whether certain types of spelling instruction are superior in teaching various word types. This particular study found no statistically significant method to teach students with mild learning and behavior problems to spell. However, all students improved their overall spelling skills.

Posttest

The mean posttest score for the traditional group was 62% while the mean posttest score for the explicit rule-based group was 71%. Although mean scores were not significant, all students performed better on the posttest compared to the pretest (explicit rule-based group with 48%; traditional group with 44%). Once again, all students showed an increase in spelling performance.

Test of Written Spelling-4

The mean *TWS-4* scores for the traditional group were 44% with the explicit rule-based group mean of 48%. The total scores did not differ significantly. These findings are represented in Table 6. The *TWS-4* was utilized to determine equivalences among treatment groups at the onset of intervention. Although not significant, the explicit rule-based group was performing at a slightly higher percentage before instruction began.

Maintenance Test

The maintenance test was administered two weeks after the intervention. There were 30 words on the maintenance test (ten words randomly chosen from each of the three word types). A maintenance test was used since the majority of reported spelling interventions do not use a maintenance measure (Wanzek, Vaughn, Wexler, Swanson, Edmonds, & Kim, 2006).

Results of the maintenance test scores for the traditional group were 60% with the explicit rule-based group mean of 62%. Both groups performed poorly on the maintenance test. These results parallel other findings that discuss how difficult it is for students with mild learning and behavior problems to maintain their spelling skills.

Student Satisfaction Scale

A Student Satisfaction Scale was administered the day after the intervention. The purpose of the scale was to determine whether there were differences in the groups' attitudes towards the way they were taught. Results of the Student Satisfaction Scale suggested that there was no difference between groups. Results of the questionnaire did not produce significant differences for attitude or instructional type preferences (see Table 7).

Interestingly, both groups were confident in their spelling abilities, ability to correct misspelled words, and thought they would be better future spellers regardless of previous test grades. Not having to do their spelling work autonomously might have caused students to say they prefer the way the researcher taught them spelling, simply because they weren't having to sit at their desks silently. Also, students contend that they are able to correct their own mistakes, however, the researcher noticed that on some

spelling tests, students would put an X next to a word they knew was wrong. Students seemed to recognize that a word was misspelled, but could not utilize effective spelling strategies.

Informal Interviews

The researcher was interested in learning about the students' thoughts about themselves as spellers. The purpose of the interviews was to determine whether there are themes or patterns in the way students describe their spelling skills.

Two students randomly chosen from each grade level were interviewed. As reported earlier, most students had similar responses to all interview questions. When asked, "What makes somebody a good speller?" students did not respond with any type of spelling strategy. Replies consisted of ineffective strategies like writing words neat, paying attention, and trying hard. When students were asked the strategy they used to spell an unknown word, two replied with the strategy of sounding it out, other responses consisted of asking a teacher or using a dictionary. Research has shown that utilizing dictionaries and spell checkers are not effective strategies (Montgomery & Mastropieri, 1996). Unfortunately, most students have developed compensation techniques that are time-consuming, and frequently unsuccessful. Their only successful strategy involved seeking assistance from others.

When students were asked if they liked how they were taught spelling, three of the students in the explicit rule-based group made reference to instructional features within the lesson. Features such as pacing (I could finish my work), variety of spelling activities (I didn't know what we would be doing everyday), saying the words out loud everyday, then spelling the word out loud and having students say the word. Students

who finished their work seemed to exhibit a sense of enjoyment of the lesson and feelings of success. Some observable behaviors were students smiling, announcing proudly that they had finished their work, and asking for their work to be checked. However, the last comment, “It was o.k. It was work,” was made by an explicit rule-based group student.

Typical spelling instruction takes place in the regular education classroom with students working independently. Simply changing the location of where spelling lessons were taught and utilizing small group settings along with having teacher-student interactions may have caused all students to agree that they liked the way they were taught spelling.

No student could think of or explain a time when they had used their new spelling skill in another subject. This is consistent with other spelling research in that students have difficulty transferring newly acquired skills to other content areas (Butyniec-Thomas & Woloshyn, 1997; Darch, et al, 2000; Wirtz, Gardner, Weber, & Bullara, 1996).

Students responded with mad, sad, and nervous when they have difficulty spelling a word. Some responded with a variety of behavioral strategies such as hiding their work, or behaving inappropriately so as to avoid work. Most students could not recall effective strategies they use for spelling their words, their ineffective strategies leave them frustrated. Surprisingly, four of the students who performed poorly on the overall components of the study, still considered themselves good spellers.

Conclusion

The present study investigated the efficacy of a traditional versus explicit rule-based method for teaching students with mild learning and behavior problems how to spell. Overall results suggested that both types of instruction were effective in teaching students to spell. Results also suggested that students had no preference for the way they were taught spelling and that they enjoyed spelling. Informal interviews suggested that students in general have difficulty using the correct spelling strategies and transferring those skills to other content areas, and may display inappropriate behavior when frustrated.

The lack of explicit rule-based performance in this particular study contradicts a large body of evidence that suggests a more systematic approach to spelling is most effective in teaching students with mild learning and behavior problems to spell (Brown, Sinatra, & Wagstaff, 1996; Darch & Simpson, 1990; Stanovich, 1986; Stein, Carnine & Dixon, 1998; Winterling, 1990).

Surprisingly, the present study failed to produce similar results to those listed above. There are some factors that may have caused these results. The discussions of these limitations follow.

Limitations

With any type of research, there are limitations and unforeseen circumstances that the researcher may encounter while collecting data in the field. Schools and classrooms also have preexisting situations that the researcher may not be able to anticipate.

Demographic Features

Although subjects represented different race, gender, disability, and spelling achievement, generalizations of the results to different populations may be problematic. The study was also isolated to one inner city school in Southeast Alabama, which makes it difficult to generalize to other settings. Some parents might have been reluctant to let their child participate because of fear or misunderstanding of the process.

Legislation

Labeling a student with a disability also becomes problematic. States vary in disability requirements under IDEIA (2007). School systems also vary in how they define students as at-risk. These varying labels would make this study even more difficult to replicate. Furthermore, having a wide range of ability types (students with mental retardation along with students considered at-risk) may have diluted the effectiveness of this study.

Clearly, the No Child Left Behind Act makes it extremely difficult to access students with disabilities. In inclusion settings, students are being instructed by their highly qualified teacher. Thus, special education teachers are no longer solely responsible for educating students with disabilities in their resource rooms. Special education teachers have taken on a role of consultant and rarely provide direct services. This major shift within education makes it extremely difficult to teach students with disabilities in isolation, or teach in small groups. The teaching responsibilities of a special education teacher and the general education teacher, has expanded to include all students regardless of ability. The brevity of this study also made it difficult to find significant instructional effects.

Researcher Constraints

Another limitation may be unintentional bias since the investigator was also the experimental teacher. Although fidelity of treatment measures were taken to address this limitation, it could still be considered a drawback to the research design. In addition, since the researcher was someone new to them, students may have acted differently (behaved) or put forth more effort in their spelling. Since the intervention was only three weeks, students had little time get familiar or comfortable with the researcher.

The brevity of the intervention may also account for the limited number of behavior problems that the researcher was warned about. Students were taught in a small group setting that differed from their large group, seatwork only routine. Some students noted that they only did spelling when their teacher had time. In some classrooms, spelling instruction was not implemented everyday. The brevity of the study may have contributed to students not making as many gains as expected.

School Environment

There were some classroom situations the researcher was unable to overcome. One teacher in particular was reluctant to release her students to go to spelling instruction. Pressures to increase student performance on federal and state tests concerned teachers who allowed their students to participate. Even though instruction lasted 20-25 minutes daily at a predetermined time, some teachers had changed their schedules to prepare for testing, and spelling small groups had become somewhat of an inconvenience.

During week two of the intervention, all students were preparing for the anti-drug assembly they were having on Friday. These daily preparations were unscheduled and also took place during small group spelling instruction Tuesday through Friday. Monday

of that week was also a major holiday, so one day of instruction was not implemented. Students were very excited about their anti-drug skits and songs.

On Monday of week three, students began preparing for classroom Valentine's Day parties for Wednesday afternoon. This preparation also took place during small group spelling instruction. Friday of that same week, students also had to prepare for "Community Learning Friday." Once a month, a community leader or business comes to the elementary school to talk about their career or business. For this particular Friday, it was the local karate school that was performing and students had begun to practice their karate skills for the assembly. This too, took place during spelling instruction. For weeks two and three of spelling instruction, students were generally hyped up and excited about the weeks events.

These distractions may account for poor performance on week 2 and 3 unit tests, posttest, and maintenance test. Some students stated that they had some of their words as spelling words before. It would have been virtually impossible to construct a set of unfamiliar words for the study. Lastly, since lesson plans were constructed from currently used basal programs, the evaluation of an individual strategy or format was not feasible.

Recommendations for Future Research

Recommendations for future researchers should include increased flexibility within school systems. The researcher was fortunate enough to have a good working relationship with the elementary school. The principal had even provided the researcher with an unused classroom for small groups. Having a strong partnership alleviates the

stresses of implementing a research project along with any unexpected situations throughout a project. This study should be replicated with the following improvements.

1. This study should be replicated using different teachers or more than one teacher.
2. This study should be replicated with students with disabilities in other appropriate educational settings.
3. A narrower focus on a certain strategy or skill could yield instructional effects for teaching students to spell.
4. Researchers should continue to investigate the benefits of longitudinal or single subject designs for evaluating spelling achievement.
5. Researchers should continue to attempt to investigate populations of students with mild learning and behavior problems, at all grade levels.
6. Future researchers should strengthen fidelity of treatment measures by having more than one observer.
7. Researchers should investigate the effectiveness of computer aided spelling programs.
8. Continuous research should be conducted to determine the inservice and interest needs of classroom teachers.

Overall, future researchers should focus on improving research-based practices for teaching students with mild learning and behavior problems to spell whole words, as well as phonemic and morphemic parts. Ultimately, future research should include maintaining and transferring new spelling skills to novel situations in order for students to become autonomous in their spelling, while potentially, improving their reading and writing skills.

Summary

In the present study, 41 students from an inner city elementary school in Southeast Alabama with mild learning and behavior problems were randomly assigned to either the traditional or explicit rule-based group. Daily instructional sessions lasted 20-25 minutes for a total of three weeks. Every effort was made to ensure differences in spelling performance were due to instructional features.

Results suggest that both types of instruction were effective in teaching students to spell. Findings indicated that students had no preference for the way they were taught spelling and that they enjoyed spelling. Informal interviews revealed that students in general have difficulty using the correct spelling strategies, transferring those skills to other content areas, and may display inappropriate behavior when frustrated. The results of this study should in a small way, encourage researchers to continue their efforts in teaching students with mild learning and behavior problems to spell.

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APPENDICES

APPENDIX A

LETTERS OF INFORMED CONSENT

Ms. Kate Simmons,

After reviewing the proposed study, "The effectiveness of two highly dissimilar spelling methods for teaching elementary students with mild learning and behavior problems," by Kate Simmons, a doctoral student at Auburn University, I have agreed to grant permission to allow the study on spelling instruction to be conducted at my school. Students with disabilities, Title I students, and at-risk students are eligible to participate.

The purpose of this study is to determine which of the two spelling methods will be more effective in improving the spelling performance of students with learning and behavior problems in third to fifth grade students. The primary activity in this study will be to teach children to spell a variety of spelling words.

I understand that instruction will last three weeks with lessons lasting 20-25 minutes Monday through Thursday. I also understand that instruction will occur during the students' normal academic schedule. Since spelling instruction is a part of everyday classroom instruction, students' normal spelling instruction is not being withheld if a parent chooses not to let their child participate. Their data will be used for grading purposes only. Although spelling instruction will continue throughout the academic school year, I expect this project to end no later than October 1, 2006

I understand that any information obtained in connection with this study and that can be identified to students will remain confidential and be kept in a locked office. Information collected may be used to fulfill an educational requirement for a doctoral dissertation, published in a professional journal or presented at conferences. No identifiable information will be included.

I look forward to working with you during this time. Please let me know if I can be of any further assistance.

Sincerely,

Informed Consent

For a research study entitled, "The Effectiveness of Two Highly Dissimilar Spelling Methods for Teaching Elementary Students with Mild Learning and Behavior Problems."

You are invited to have your child participate in a study on spelling instruction. This study is being conducted by Kate Simmons a doctoral student at Auburn University under the direction of Dr. C. Darch in the Department of Rehabilitation and Special Education at Auburn University. The purpose of this study is to determine which of the two spelling methods will be more effective in improving the spelling performance of students with learning and behavior problems in third to fifth grade students. Your child was selected as a possible participant because of his/her remediation needs in the area of reading or they qualify under The Individuals with Disabilities Act (IDEA, 2004) as having a disability.

If you decide to allow your child to participate, instruction time should last 20-25 minutes a day for at least four days a week with his/her peers. The instruction will last three weeks. Your child will be assigned to one of two groups and will receive a researched based method of spelling instruction. Since spelling instruction is a part of everyday classroom instruction, your child's normal spelling instruction is not being withheld, nor will their daily routine be disrupted. He/she will be taught to spell a variety of words and be asked to write those words from dictation. At the end of the study, your child will be given an individualized report that provides their individual, group and whole group spelling achievement. This is a research project - not a treatment for your child's condition. If you decide to not let your child participate, they will continue to receive their normal, everyday, spelling instruction.

Any information obtained in connection with this study and that can be identified to your child, will remain confidential and will be disclosed only with your permission. If you give permission by signing this document, the information collected will be disclosed in the form of a completed research study. Information collected throughout the study may also be published in a professional journal or presented at conferences. If so, none of your child's identifiable information will be included. Data will be kept in a locked cabinet within my locked office. All identifying data (or codes) will be destroyed.

You may withdraw your child from participation at any time, and you may withdraw any data that which been collected about your child. Your decision whether or not to participate will not jeopardize your future relations with Auburn University, Opelika City Schools, or your teachers. If you have any questions please contact me, Kate Simmons or Dr. Craig Darch at 334-844-5943, we will be happy to answer any questions. You will be provided a copy of this form to keep. If you have read and have decided to let your child participate, please review this information with your child.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334) 844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH TO HAVE YOUR CHILD PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

_____ _____

Parent's or Guardian Signature Date Print Name

_____

Child's Name Date

Informed Consent

For a research study entitled, "The Effectiveness of Two Highly Dissimilar Spelling Methods for Teaching Elementary Students with Mild Learning and Behavior Problems."

Kate D. Simmons

You are invited to participate in a study of spelling instruction conducted by Kate Simmons, doctoral student at Auburn University under the direction of Dr. Craig Darch from the Department of Rehabilitation and Special Education. The research focus is to determine the effectiveness of two highly dissimilar spelling methods with students with learning and behavior problems. Because you are the teacher of students with special needs, we are asking you to help facilitate spelling instruction.

Spelling intervention will take about 20-25 minutes a day and will occur for three weeks. The primary activity will be to teach children to spell a variety of spelling words.

In participating, your responsibilities will be to identify preferred times for spelling instruction. We do not anticipate any risks associated with participation in this study. This intervention can be done during your regular spelling schedule. Research information will be coded to ensure your confidentiality and kept in a locked office. I will be responsible for assuring that only Dr. Darch and myself has access to study information.

Your participation is voluntary. Your decision to help in this study will not affect your relationship with your school, school district, or Auburn University. If you do decide to participate, you are free to discontinue your participation at any time without penalty.

If you have any questions, please feel free to contact me, Kate Simmons, at 663-6130. If you have any questions regarding your rights as a research subject, contact the Office of Human Subjects at 844-5966. You will be offered a copy of this form to retain in your files.

Your signature indicates that you have read and understand the information provided above, that you willingly agree to help facilitate instruction, that you may withdraw your consent at any time and discontinue participating without penalty, that you will receive a copy of this form, and that you are not waiving any legal claims, rights, or remedies.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

_____ _____

Teacher's Signature Date

APPENDIX B

INSTRUCTIONAL CHECKLISTS

DI CHECKLIST

Teacher: _____ Date: _____

Observer: _____ Lesson: _____

# of students: _____ time lesson began: _____ ended: _____

+/- or NA	*Area Assessed*	*+/- NA*	*Area Assessed*
	Set-up and Prep		**Firm up**
	On schedule		Starting over
	Materials ready		Delayed test
	Rules reviewed		Lists
	Formats		**Pacing**
	Fluency of presentation		On target
	Procedural integrity		Rapid/steady
	Responses verified		Exciting
	Appropriate repetitions		Brief transitions
	Signals		**Behavior Management**
	Start/stop together		High expectations
	Visual cue consistency		Monitor behavior
	Auditory cue consistency		Specific reinforcement
	Think time/get ready		Varied reinforcers
	Individual Turns		Reinforcer intensity
	Most to LP		Vary distribution
	Student name last		Comments:
	Corrections		
	All errors immediate		
	Positive		
	Consistent		
	Specific		

List Verbal Reinforcers	

TRADITIONAL CHECKLIST

Teacher: _____ Date: _____

Observer: _____ Lesson: _____

# of students: _____ time lesson began: _____ ended: _____

+/- or NA	*Area Assessed*	*+/- NA*	*Area Assessed*
	Set-up and Prep		**Firm up**
	On schedule		Starting over
	Materials ready		Delayed test
	Rules reviewed		Lists
	Formats		**Pacing**
	Fluency of presentation		On target
	Procedural integrity		Rapid/steady
	Responses verified		Exciting
	Appropriate repetitions		Brief transitions
	Individual Turns		**Behavior Management**
	Most to LP		High expectations
	Shared turns		Monitor behavior
	Corrections		Specific reinforcement
	Specific		Varied reinforcers
	Positive		Vary distribution
	Consistent		
	Comments:		

List Verbal Reinforcers	

STUDENT ATTITUDE/SATISFACTION SCALE

Directions: (To be read by teacher)

We would like to know how you feel about spelling. Please answer the following questions as honestly as possible. Do not put your name on the sheet. On the sheet you will find 10 questions about spelling. After I read each question, you are to decide if you agree, somewhat agree, or disagree with the question. For example, the first question states, “I like hot dogs.” Most children would circle agree, since most children like hot dogs. Everyone, find the example and circle agree, somewhat agree, or disagree to show how you feel about hot dogs (teacher pause). Any questions on how to mark the survey?

You should listen carefully as I read each question. Decide how you feel about each one and circle your answer. Circle how you honestly feel about the question.

Teacher then administers survey.

Student Satisfaction Scale

Example: I like hotdogs		*Agree*	*Somewhat agree*	*Disagree*
Student attitude	1. I like spelling	Agree	Somewhat agree	Disagree
	2. I would rather do math than spelling	Agree	Somewhat agree	Disagree
	3. I avoid spelling when I can	Agree	Somewhat agree	Disagree
	4. I have learned new ways to spell	Agree	Somewhat agree	Disagree
	5. I have learned how to correct my spelling	Agree	Somewhat agree	Disagree
Instructional effects	6. I like the way the teacher teaches me to spell	Agree	Somewhat agree	Disagree
	7. I think I will be a better speller in the future	Agree	Somewhat agree	Disagree
	8. Spelling is easy for me	Agree	Somewhat agree	Disagree
	9. When the class is asked to spell words mine is one of the best	Agree	Somewhat agree	Disagree
	10. I wish I could be taught spelling this way more often	Agree	Somewhat agree	Disagree

APPENDIX C

LESSON PLANS

Teachers Manual ~ Traditional Method

	Daily Objective	Daily Goals
Monday	Pretest and lesson introduction	• Pretest with self correction (5 minutes) **Teacher says:** *Listen. Now we are going to take a pretest. I will call out each word, use it in a sentence and repeat the word. I can only say each word one time, so listen carefully. There will only be twenty words* (teacher passes out pretest sheet). *Remember to write your name at the top of your paper*. Teacher should then call out each word as described above. After the pretest has been administered. The teacher should spell each word out loud to have students correct their pretest. **Teacher says:** *Listen. Now we are going to correct our tests. I'll spell each word; write the correct spelling next to each missed word.* • Word search (5 minutes) **Teacher says**. *Listen. Now you are going to complete a word search using your weekly spelling words. Some words may be up, down, or vertical. You will have 5 minutes to work your puzzle* (teacher passes out puzzle and reminds students to place their name at the top of their paper). • Independent practice (10 minutes) **Teacher says:** *Listen. Now you're going to think critically, practice, write, and check you're spelling words. First, you write your word. Check your work. Correct your spelling. Cover the word, say the letters in your mind, and look at the word again. Do this for each word.* Teacher then provides one example. Teacher circulates for the remainder of the activity to ensure students are completing work.

Tuesday	Think and Practice	• Letter scramble (5 minutes) **Teacher says:** *Listen. Now you're going to do a fun word scramble (teacher hands out worksheet). The directions say: Find the spelling word among the other letters. Cross out the letters that do not belong. A word bank is given.* Teacher then circulates for the remainder of the activity. • Letter clues (5 minutes) **Teacher says***: Listen. Now you're going complete a worksheet on letter clues.* Teacher passes out worksheet. *Each spelling word is missing their vowels. Fill in the vowels to make one of your spelling words.* Teacher then circulates for the remainder of the activity. • Spelling addition (10 minutes) **Teacher says:** *Listen. Now we are going to do some spelling addition. First, you choose any two spelling words you want. Next, you count how many letters are in each word. Then, you add the two numbers together. Let's do one together.* Teacher then demonstrates how to do spelling addition. Teacher then circulates for the remainder of the activity.
Wednesday	Proofreading, Vocabulary and Writing	• Finish spelling addition activity Teacher says: *Today we are going to finish your spelling addition. Remember, you choose any two spelling words you want. Next, you count how many letters are in each word. Then, you add the two numbers together.* Teacher then circulates for the remainder of the activity. Teacher should give students 5-10 minutes to finish activity. • ABC order (5 minutes) **Teacher says:** *Listen. Now you are going to put your words in ABC order.* Teacher then passes out paper. Teacher circulates for the remainder of the activity. • Find the misspelled word (10 minutes) **Teacher says**: *Listen. You will be given a choice of 4*

		words. One word is misspelled. Cross out each word that is misspelled correctly. Teacher circulates for the remainder of the activity.
Thursday	Writing, Context clues, Review	• Definitions/word meaning (5 minutes) **Teacher says**: *Listen. Read each sentence to figure out which spelling word matches the definition. Remember read each sentence carefully*. Teacher circulates for the remainder of the activity. • Writing prompt (15 minutes) **Teacher says**: *Listen. Now we are going to do some writing. You may choose 12 spelling words and write a sentence using each word. Make sure each word is spelled correctly and that each sentence begins with a capital letter and ends with a period.* Teacher circulates for the remainder of the activity. * Teacher should remind students about their weekly spelling on Friday.
Friday	Weekly spelling test	• Complete spelling test **Teacher says**: *Listen. Now we are going to take our test. Remember to always do the best you can. I will call out each word, use it in a sentence and repeat the word. I can only say each word one time, so listen carefully. There will only be twenty words* (teacher passes out pretest sheet). *Remember to write your name at the top of your paper*. Teacher should then call out each word as described above.

Sample of Student Worksheet ~ Traditional Method

LETTER SCRAMBLE. Find the missing vowels to complete each word.

WORD LIST
beneath
reaching
roadside
throat
entertain

1. _n t_r t_ _ _n
2. t h r _ _ t
3. b _n _ _t h
4. r _ _ c h _ n g
5. r _ _ d s _ d _

LETTER CLUE. Find the spelling word among the other letters.

WORD LIST
deed
snail
keep
sand
mate

1. scnaihl
2. maette
3. keeasp
4. shankd
5. sdeeadl

SENTENCE CLUES. Read each sentence to figure out the spelling word.

1. You get groceries there _____
2. The opposite of sit _____
3. A small animal _____
4. A horse sleeps and eats here _____
5. Balling your hand up makes this _____

INTRODUCTION

1. I'll say words.
2. throat. Say it. *Signal.* throat.
3. I'll spell throat: t-h-r-o-a-t.
4. You spell throat.
   Get ready. *Signal.* T-h-r-o-a-t.
5. beneath. Say it. *Signal. beneath*.
6. I'll spell shack: b-e-n-e-a-t-h.
7. You spell beneath

Get ready. *Signal.* beneath.

8. reaching. What word? *Signal.* reaching
9. Spell reaching.
   Get ready. *Signal.* R-e-a-c-h-i-n-g.
10. loaded. What word? *Signal. loaded*.
11. Spell loaded.
    Get ready. *Signal.* L-o-a-d-e-d.
12. Repeat steps 2-4 with remaining words.

EXERCISE 1 SENTENCE VARIATIONS

1. Find Part A on your worksheet.
2. You are going to write sentences made up of words you know how to spell.
   Remember to put the right end mark at the end of each sentence.
3. Sentence 1: **Where are the girls going?**
   Say that sentence. Get ready. *Signal.* Where are the girls going?
   Repeat until firm.
4. Write it on line 1.
5. Get ready to check your spelling. Put an X next to any word you missed.
6. Spell Where.
   Get ready. *Signal.* W-h-e-r-e.
   Write Where.
   Check it.
7. Spell are.
   Get ready. *Signal.* A-r-e.
   Write are.
   Check it.
8. *Repeat step* 7 *for: the, girls, going.*
9. What end mark did you put at the end of the sentence? *Signal.* A question mark.

Write a *question mark.*
Check it.
10. Fix up any words you missed.
I *Repeat steps* 3-9 *for the remaining sentences:*
What is that girl doing?; Where are the boys friends?

EXERCISE 2 SPELLING REVIEW

1. I'll spell some words.See if you can figure out each word.
2. Listen: s-h-a-r-p.Everybody, what word? *Signal.* sharp.
3. Listen: k-e-e-p.What word? *Signal.* keep.
4. *Repeat step* 3 *for: some, deed, snail, mate, stand, beneath, dear, grave, and stove.*
5. Find Part B on your worksheet. Get ready to write some of those words.
6. First word: mateWrite it.
7. Next word: someWrite it.
8. *Repeat step* 7 *for: snail, stand, beneath, stove.*
9. I'll spell each word.
Put an X next to any word you missed and write that word correctly.
Spell each word twice.
Write each word as *you spell it.*

EXERCISE 3 SENTENCES

1. Find Part C on your worksheet. The sentence should say:
She was beneath the stove.
2. Listen again: She was beneath the stove.
3. Say that sentence. Get ready. *Signal.* She was beneath the stove. *Repeat until firm.*
4. Fill in the blanks. *Check.*
5. Now let's spell the words in that sentence.
6. Spell She. Get ready. *Signal.* S-h-e.
7. Spell was. Get ready. *Signal.* W-a-s.
8. *Repeat step* 7 *for: beneath the stove.*
9. *Repeat steps* 6-8 *until firm.*
10. Now let's spell the words in that sentence without looking.
11. Spell she. Get ready. *Signal.* S-h-e
12. Spell was Get ready. *Signal.* W-a-s.
13. *Repeat step* 1-12 *for: beneath the stove.*
14. *Repeat steps* 11-13 *until firm.*
15. *Write on the chalkboard:*
She was beneath the stove.
Fix up any words you misspelled. Then copy the sentence on the line below.

EXERCISE 4 CONSANANT BLENDS

1. I'll say words. The second letter in each word is h.

2. sharp. Say it. *Signal.* sharp.
3. I'll spell prim: s-h-a-r-p.
4. You spell sharp.

Get ready. *Signal.* S-h-a-r-p.

5. shack. Say it. *Signal. shack* .
6. I'll spell shack: s-h-a-c-k.
7. You spell shack

Get ready. *Signal.* S-h-a-c-k.

8. shop. What word? *Signal.* shop
9. Spell shop.

Get ready. *Signal.* S-h-o-p.

10. shrimp. What word? *Signal.* shrimp.
11. pell shrimp.

Get ready. *Signal.* S-h-r-i-m-p.

12. *Call on individual students to spell words.*

EXERCISE 5 MATCHING

1. Find Part C on your worksheet.
2. This is a matching exercise.

The lines are not drawn in, but some letters are given for the words in the second column. You have to figure out what each word could be, write the word, and draw a line to the same word in the first column.

Do it.

3. *Check and correct.*

Explicit Rule Based ~ Student Worksheet

Name: _____ Lesson: _____

PART A:

1. _____
2. _____
3. _____

PART B:

1.	2.
3.	4.
5.	6.
7.	8.

PART C:

1.	2.
3.	4.
5.	6.
7.	8.

PART D:

1. _____
2. _____
3. _____