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The Effects of Teaching Two Syllable Types and One Syllabication Rule on the Spelling Achievement of Students with Learning Disabilities

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THE EFFECTS OF TEACHING TWO
SYLLABLE TYPES AND ONE
SYLLABICATION RULE ON THE SPELLING
ACHIEVEMENT OF STUDENTS WITH
LEARNING DISABILITIES

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MASTERS THESIS

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Abstract

The purpose of this study was to determine whether teaching two syllable types and one syllabication rule in a reading program would affect the spelling achievement of students with learning disabilities. Seven fifth-grade students with learning disabilities from western-lower Michigan participated in this study. The intervention involved teaching the closed syllable and silent-e syllable in conjunction with the VC/CV syllabication rule. During the closed syllable phase and the silent-e phase, the students were given a ten word spelling test on Monday of each week. To determine spelling achievement, the students were evaluated for both word accuracy and syllable accuracy. The results showed a substantial increase in spelling achievement for both the closed syllable spelling test and the silent-e syllable spelling test. Also, the syllable accuracy test revealed the most substantial effect in increasing the spelling achievement scores of students with learning disabilities.
CHAPTER 1
The Problem

Many students with learning disabilities have difficulty in the areas of reading and spelling. According to Trieman, Berch, Tincoff, and Weatherston (1993) there are at least two ways in which children are taught to spell a word. One way is to use rote memorization to remember the letters in the words. Another way is to use a phonological strategy such as breaking the words into smaller units of sound. Phonology has been found to play an important role in spelling from an early age (Trieman et al., 1993). Yet another researcher proposed that a major cause of reading disability is "inadequate instruction spawning limited reading and spelling development" (Ehri, 1989, p. 356).

Importance of the Study

There are three reasons why teaching students a phonological strategy such as syllable types and syllabication rules as part of a reading and spelling program are important. The first reason is phonological awareness plays an important role in spelling from an early age. According to Trieman et al. (1993), "Children's errors reflect both the idiosyncrasies of the English writing system and the limitation of their phonological analysis abilities" (p. 268). Phonological awareness is important if students are to "have full access to the alphabetic principle in decoding and spelling" (Lindamood, Bell, & Lindamood, 1992, p. 256). Phonological awareness includes the skills of segmenting, blending, and deleting letter sounds. These skills, when developed, can greatly increase a student's reading and spelling achievement.

The second reason for including syllable types and syllabication rules in a reading program is that students with learning disabilities learn differently than students without learning disabilities. Zecker (1991) found that students with learning disabilities develop phonological awareness much later than students without learning disabilities.
This learning difference can greatly affect a student's reading and spelling development. As a result, students who "do not have age-appropriate phonological awareness skills must be taught such skills directly" (Felton, 1993, p. 587). Teaching these skills should be an important focus when working with these diverse learners.

The third reason for including syllable types and syllabication rules in a reading and spelling program is that there is a relationship between orthographic training and the acquisition of spelling skills. Research has shown "that a systematic training program in word analysis has a facilitating effect on reading and spelling acquisition" (Lie, 1991, p. 247). A student's knowledge of the orthographic structure of words gives the student a tool to become a more effective speller. Teaching students a strategy to break the reading code seems to have a positive effect on spelling achievement.

Background

Looking at the historical background of spelling, little research has focused on the development of spelling proficiency in students with learning disabilities and students without learning disabilities. Given that so much research has been conducted in reading and that many theorists have stated the close relationship between the areas of spelling and reading, this lack of research is unexpected (Zecker, 1991). As early as 1967, Myklebust's research showed a relationship between reading and spelling acquisition.

Phonological development has been shown to play a key role in spelling proficiency. Tangel and Blackman, (1992) researched the relationship between phoneme awareness and invented spelling. They found that children's knowledge of English phonology (the sound system of English) was related to their ability to deduce the alphabetic principle (Tangel & Blackman, 1992). The alphabetic principle is the awareness of the internal phonological structure that the alphabet represents. This finding has profound importance as to the role of phonemic awareness in the...
acquisition of spelling skills.

The traditional teaching of spelling often involving rote memorization of a string of letters, has remained a common practice in most classrooms. This style of teaching may not give students with learning disabilities adequate strategies to master spelling skills. According to Zecker (1991) orthographic code develops at different rates in students with learning disabilities and students without learning disabilities. This evidence supports the idea that integration of syllable types and syllabication rules into a reading and spelling program could significantly affect spelling achievement in students with learning disabilities.

Statement of Purpose

The purpose of this study is to determine if teaching syllable types and syllabication rules in a reading program affect the spelling achievement of students with learning disabilities. The results will be used to evaluate the usefulness of implementing this reading and spelling strategy into the current curriculum.
CHAPTER 2
Review of Literature

Many factors need to be considered when developing an effective reading and spelling program for students with learning disabilities. According to Vallecorsa, Zigmond, and Henderson (1985) "teachers use a variety of methods on a regular basis which lack empirical support in teaching spelling" (p. 19). In this paper, four areas of research will be discussed. The first area will focus on the learning differences between students with learning disabilities and students without learning disabilities. One of the most common identifying characteristics of students with learning disabilities is failure to acquire the ability to spell accurately (Gerber & Hall, 1987). Students with learning disabilities have unique differences in the areas of reading and spelling development. These differences require definite strategies to help them develop in these areas. The second area will focus on various spelling strategies which can be implemented in the classroom. Teaching strategies can give a student the tools necessary to succeed in the classroom. The third area will focus on how the development of orthographic code can affect the areas of reading and spelling achievement. According to Felton (1993), children benefit from being taught how to break words into onset and rimes and from syllabication instruction. Finally, the last area will focus on the role of phonemic awareness in the development of reading and spelling skills.

Learning Differences

The first area of consideration when planning for spelling instruction involves looking at students' learning differences. Students with learning disabilities have developmental differences which can negatively affect spelling achievement. Therefore, when planning spelling instruction these differences need to be addressed accordingly. The following studies look at the unique differences in reading and spelling development between students with learning disabilities and students without learning disabilities.

In the first study, Zecker (1991) examined orthographic code development in
students with learning disabilities. The purpose of this study was to make a comparison between young children without learning disabilities and the reading ability and spelling ability of older, matched peers with learning disabilities. This study was to provide evidence of the similarities and differences between these two groups in the area of orthographic processes underlying spelling which they use. In this study, 54 subjects participated ranging in age from 7.0 to 11.5 years. Half of these subjects were students with learning disabilities while half were students without learning disabilities. The students' recognition of orthographically similar rhymes and orthographically dissimilar rhymes was assessed. Each experimental segment consisted of 128 trials, one-half were rhyming word pairs while the other half were non-rhyming word pairs. Of the 64 rhyming pairs, 32 formed orthographically similar rhymes (e.g., BUM-GUM), while the other 32 pairs formed orthographically dissimilar rhymes (e.g., THUMB-GUM). Students heard each word pair and indicated whether the words formed a rhyme (a "yes" response) or a nonrhyme (a "no" response).

The results indicated that children even as young as seven years of age found the rhyming task to be quite easy. Still, more errors were seen for the students with learning disabilities (mean of 7.0 errors out of 128 trials or 5.4 percent) than for the students without learning disabilities (mean of 4.2 errors out of 128 trials or 3.3 percent). Moreover, the students with learning disabilities and young students were the slowest responders and made the most errors. These results clearly support the idea that orthographic code develops at different rates in students with learning disabilities and students without learning disabilities. That is, orthographic code develops slower in students with learning disabilities than in students without learning disabilities.

In a similar study, Foorman and Liberman (1989) predicted that poor readers, in contrast to good readers, would benefit from the visual-orthographic pattern available in a clue word. They predicted good readers would show a regularity effect in their recognition of exception word targets, like 'comb', by selecting from a list the words with the regularized spelling, like 'come'. The subjects consisted of 80 first graders.
from three schools in Houston, Texas. The ages ranged from 6.1 to 7.10 years with a mean of 6.9 years. The students were divided into two groups: poor readers and good readers. The two groups were assessed to see whether poor readers rather than good readers would benefit from the visual orthographic code pattern available in a clue word.

The spelling test consisted of five groups of 12 words each. Each group contained eight randomly selected words with regular spelling patterns (e.g., lime, rate, kite) and four randomly selected exception words (e.g., chrome, phase, comb). The teachers administered the test over the period of a week, one group of 12 words per day. A recognition test consisted of 60 lists of seven words, either with (clue condition) or without (no clue condition) a clue word typed in bold at the top of each list. In the no clue condition the experimenter stated the word, pointed to the list of seven words, and asked the child to mark the number next to the word the experimenter said. In the clue condition the experimenter pointed to the bold-typed word, pronounced it, and then pointed to the list of seven words and asked the child to mark the number next to the target word. The final test administered was Rosner's Test of Auditory Analysis Skills (TAAS).

The results showed that good readers were almost twice as accurate on regular words as they were on exception words. In contrast, poor readers' low accuracy favored regular words only slightly. There also was a tendency for poor readers to make nonphonetic errors on exception words more than on regular words, while for good readers there was little difference in performance for either type of word. Poor readers' spelling errors were equally likely to be phonetic or nonphonetic. While good readers' tended to spell phonetically, almost twice as often on exception words as on regular words. Finally, the nature of good and poor readers' errors in the recognition test was different depending on whether or not a clue was present. Poor readers were more likely to choose alternatives related to the target under the clue condition than under the no clue condition. Overall, these results suggest that good readers were
more successful at identifying regular words than exception words and have more advanced phonetic skills than do poor readers.

In a third comparison study, DeMaster, Crossland, and Hasselbring (1986) looked at the consistency of students with learning disabilities spelling performance. Spelling consistency was examined in terms of word accuracy and specific types of errors in two forms of dictated spelling assessment. This study consisted of 20 subjects from two elementary schools within a large North Carolina public school system. All these students had been identified as learning disabled, were receiving special education services at the time of the study, were enrolled in grades 3-6, and were identified as having significant spelling difficulties. The subjects were given two forms of written spelling assessment, a dictated word list and a dictated paragraph containing words from the list. The dictated target words, in list and paragraph forms, were presented orally by one person to all subjects within their classroom environments. During the paragraph dictation, students were told where to punctuate so students could concentrate more on the spelling process rather than on other linguistic elements.

The results indicated that spelling consistency (as manifested by spelling accuracy) in the students with learning disabilities sample was not related to the students' level of spelling skill. With respect to the correlation coefficients for each subject, spelling consistency did not appear to vary greatly between good and poor spellers. Students with learning disabilities were consistent in the specific types of misspellings they made when errors from the dictated list test were compared with errors from the dictated paragraph test. The evidence suggested that the consistency of spelling patterns reflected an attempt on the part of the students with learning disabilities to utilize a structured, systematic approach to spelling tasks.

In a fourth comparison study, Bryant, Drabin, and Gettinger (1981) looked at the degree to which varying the number of spelling words taught relates to the percentage of words spelled correctly by children with learning disabilities. The purpose of this
study was to observe the effect of varying the number of words taught each day on spelling achievement of children with learning disabilities after three days of instruction with efficient teaching procedures. This study consisted of 64 children identified as learning disabled from New York City Board of Education classes for the neurologically impaired or in resource rooms for students with learning disabilities. The students were then divided into three instructional groups. All the children were taught during 30- to 40-minute sessions for three consecutive days. The treatment groups only differed in the number of words taught each day: Group A (three-word unit group), Group B (four-word unit group), and Group C (five-word unit group). The words used for instruction were chosen on the basis of phonemic irregularity (not spelled the way they sound). Each group was taught in the same format of instruction, followed by a posttest after the completion of instruction.

Many results were gathered from this study. The first result was that the average total words learned and response memory for words taught did not differ among groups. The students averaged learning to spell between seven and eight words during the three-day instructional period, regardless of the total number of words actually presented. The second result was the average number of nine common words spelled correctly on the posttest differed among groups. There was a significant difference between the three- and four-word unit groups, and the three- and five-word unit groups. As the number of words increased, there was a substantial increase or transposition of word parts. That is, a type of spelling error in which parts of words are interchanged (e.g., aprean for apron, ocain for ocean, agon for again). Teachers reported less fatigue and distractability when three words were taught each day. The last result was that a significantly higher proportion of students reached the 80% criterion level in the three-word group. These results suggest when students with learning disabilities are given more than three words per day their spelling performance decreased.

In the last study observed, Morris, Blanton, Blanton, and Nowacek (1995)
looked at the question of whether low-achieving spellers should be taught at their instructional level. This study consisted of seven third-grade classrooms in three rural counties of western North Carolina. The average class size was 22 students, with the students coming mostly from Caucasian, lower middle socioeconomic status families. Based on pretest spelling scores, of all the students 48 were identified as low-achieving spellers. The students were assessed to determine whether spelling achievement would increase if the students were taught at their instructional spelling level rather than at their actual grade level. The students were divided into three groups. The first group was the comparison group while the last two groups were the intervention groups. All three groups began teaching their students from the third grade Steck-Vaughn and Houghton Mifflin spelling programs for the first six weeks. The first group (comparison group) was taught spelling at the third grade level for the entire 36 week period. At week seven, the second group began to teach their low spellers from a second-grade spelling book for a 24 week period of time. At week 18, the third group began to teach the students in the second grade spelling book, followed up by the review of spelling words in the third grade spelling book.

The results indicated the two intervention groups, who worked in a second-grade spelling book for part of the year, scored higher than the comparison group students on the second-grade spelling posttest (74% to 64%). There was no significant difference between the two intervention groups on the curriculum-based third-grade spelling posttest, but there was a significant difference on the third-grade transfer test (a list of 25 third-grade words not taught during the year). The intervention group which received second grade spelling instruction the longest spelled correctly more third-grade "transfer" words than did the comparison group (47% to 37%), even though this intervention group received less third-grade spelling instruction during the school year. These results indicated that teaching low-achieving spellers at their instructional spelling level significantly increased spelling performance.
Summary

Combined, each of these studies compared the learning differences between students with learning disabilities and students without learning disabilities, or the differences between high-achieving spellers and low-achieving spellers. The first three studies, (DeMaster, Crossland, & Hasselbring, 1986; Foorman & Liberman, 1989; Zecker, 1991) indicated that students with learning disabilities have learning differences which can affect spelling achievement. These differences need to be observed while creating an effective spelling program for these unique learners. In the study comparing orthographic code acquisition (Zecker, 1991), children with learning disabilities were found to develop the orthographic code at a different rate than children without learning disabilities. This difference in orthographic code development gives reason to instruct students with learning disabilities in a different manner than students without learning disabilities.

In a similar study, Foorman and Liberman (1989) indicated that those students above grade level in reading excelled in phonological recoding and application of grapheme-phoneme correspondence rules and were weaker in utilization of visual-orthographic knowledge. These results indicated a relationship between phonemic awareness skills and reading achievement. In the third study, McMaster et al. (1986) showed students with learning disabilities to be consistent in their error patterns on a dictated spelling list. These results indicated that students' with learning disabilities spelling efficiency might be improved if spelling was taught using the orthographic structure of words or spelling patterns. Teaching syllable types and syllabication rules in a reading and spelling program could increase spelling performance.

Finally, implementing learning strategies are an integral part of a student with learning disabilities success in reading and spelling. Two similar studies looked at different strategies which can be utilized to increase a student's spelling achievement. One of these studies, Bryant et al. (1981) suggested that unit size had an effect on spelling in children with learning disabilities. The results indicated that children with
learning disabilities should not be given more than three spelling words each day. That is, the students with learning disabilities scored significantly higher on their spelling test when only given three new words a day. The last study, Morris et al. (1995) found that students' spelling achievement increased when they were taught at their instructional spelling level. This evidence suggests an importance to plan instruction according to a student's individual reading level. All these findings show students with learning disabilities have unique needs which can be met if instruction is planned carefully.

Spelling Strategies

Spelling strategies in the classroom are an integral factor in spelling achievement. Several studies observed taught students a strategy to utilize independently. Teaching students a spelling strategy can greatly improve a student's ability to spell more accurately. The following studies all teach students a strategy they can utilize throughout their school years.

The first study, Harris, Graham, and Freeman (1988) examined the results of strategy training and differing strategy conditions. In this study, the subjects were 40 fourth-grade students with learning disabilities enrolled in local school districts in northern and central Indiana. These students were first given the Test of Written Spelling (TWS) and then randomly assigned to one of four study conditions: teacher-directed study, student-controlled study, teacher-monitored study, and free study. The teacher-directed study, student-controlled study, and teacher-monitored study conditions required students to: (a) say the word, (b) write and say the word, (c) check the word, (d) trace and say the words, and (e) write the words from memory and check. In the free study condition, the students were simply told to study the list. Following the training session, each subject was given a written list of the appropriate 15 words. The instructor pronounced each of the assigned words and gave the students 30 minutes to study for a spelling test. Two days later a second study session was given that was identical to the first.

A 4 (study conditions) X 2 (sessions) analysis of covariance with repeated
measures was used to examine the effects of strategy training and study conditions on metamemory (prediction accuracy) and to determine if the students' prediction accuracy improved over time. The results were that the teacher-monitored group showed the greatest prediction accuracy, followed by the student-controlled group, then the directed-study condition, and finally the free-study group. Although, the most significant result was that the students in the three groups which received strategy training exhibited the greatest prediction accuracy. This indicated that students with learning disabilities benefited from receiving strategy training.

In a similar study, Dangel (1989) tried to determine whether either of two student-directed spelling strategies could be successfully used in classes for students with learning disabilities. Four teachers worked with eight students with learning disabilities over a six week period of time. The six weeks were divided into three phases comprised of two weeks each. During the first two-week phase, called the baseline phase, teachers taught the weekly spelling lessons for four days using their usual procedures and activities. The second and third phases used student-directed strategies modified from the Coach's Spelling Approach. In the second phase, the planning condition, the teachers told the students how much they would practice their spelling words by writing each spelling word on an index card and sorting the spelling words into hard and easy stacks. The students studied hard words twice as many times as the easy words using the same activities as in the first two weeks. In the third phase, self-recording condition, the teachers taught the students to use a trace-copy-cover-write procedure to study the words and to record how accurately they had practiced the words. The students continued sorting words into hard and easy stacks and used the trace-copy-cover-write procedure twice as often for hard words as for easy words. During all three phases daily spelling tests were given.

This study yielded some interesting results. As would be expected, students scored higher on each successive day of practice, ranging from 54.44% of the words spelled correctly on Day 1 to a high of 82.30% correct by Day 4. By Day 4 students...
scored an average of 68.63% correct under the baseline condition, 84.81% correct under the planning condition, and 93.44% under the self-recording condition. Students with learning disabilities improved their accuracy by learning a spelling strategy. Yet they improved even more by pairing that strategy with the trace-copy-cover-write procedure outlined in the Coach's Spelling Approach. Overall, these results suggest that students with learning disabilities benefit greatly when taught a spelling strategy which they can use independently.

In a third study, Reid and Harris (1993) focused on increased time on task and increased amounts of meaningful practice to improve spelling achievement for students with learning disabilities. This study also concentrated on students taking charge of their own spelling achievement. The research questions addressed in this study were: (a) whether self-monitoring is appropriate for learning situations, (b) whether self-monitoring of attention (SMA) or self-monitoring of performance (SMP) can lead to increased achievement, and (c) whether there are differential effects between the two conditions on academic performance. The study was conducted in a large suburban school district using 28 students with learning disabilities from self-contained classrooms. Students were assigned to one of two intervention groups. Both groups participated in the same interventions but in a different order. These interventions were (a) spelling study procedure (SSP), (b) self-monitoring of performance (SMP), and (c) self-monitoring of attention (SMA).

The results of this study showed that both self-monitoring of attention and self-monitoring of performance can significantly and meaningfully increase the level of observed on-task behavior of students with learning disabilities. The two self-monitoring conditions, SMP and SMA resulted in a significantly higher average number of correct than did the spelling study procedure. However, both the SMA and SMP conditions resulted in an increase in the average number of correct practices, and no significant difference existed between the two conditions. According to these results the self-monitoring of attention and the self-monitoring of performance improved
spelling performance. The spelling study procedure when used alone was not as effective.

In another study reviewed, Kearney and Drabman (1993) examined a write-say procedure on spelling accuracy with children with learning disabilities. The subjects in this study were four males and three females with a mean age of 11.5 years receiving special education services at a suburban school for children with learning disabilities. A baseline was formed by giving the students a ten word spelling list on Monday and asking them to study the list on their own during each spelling session on Tuesday, Wednesday, and Thursday. During the write-say method, the students were instructed to study a word list given on Monday. On Tuesday they were given a test on the words and instructed to write the incorrect words five times each while saying each word. Each day the same procedure was followed, although students were instructed to write the incorrect words 10 times each on Wednesday and 15 times each on Thursday. On Friday, the students were simply given a final spelling test and observed for accuracy. Each study session was 30 minutes in length and was strictly monitored.

The results of this study showed students improved an average of 34.9% from baseline levels following the introduction of a modified write-say intervention for children with learning disabilities. After the final experimental week, students had improved an average of 50.7% from the baseline. The write-say method provided students with learning disabilities immediate feedback using both visual and auditory modalities. These results support teaching students with learning disabilities the write-say study strategy for spelling.

The last study, McAuley and McLaughlin (1992) compared the Add-A-Word Spelling Program and the Compu Spell Program. The subjects in this study were 5 students with learning disabilities from an inclusion classroom in a middle-income suburban school in southeastern British Columbia. The Add-A-Word Program began with a pretest on Mondays. They used the study, cover, copy, and compare method to practice the words. When the students wrote the words incorrectly, they erased,
studied, covered, and rewrote them. They were then given a retest and the incorrect words were written 5 times each. The Compu Spell Program was in the computer room under the direction of the special education teacher. On the computer the students were given 12 sentences each containing a highlighted spelling word. When the student hit the space bar the highlighted word disappeared, and the student had to type that word in correctly. Students had to keep typing in the word until it was spelled correctly.

The results indicated that the percentage of words spelled correctly on weekly spelling tests increased for all 5 students when they used both the Add-A-Word and Compu Spell programs. Individual scores indicated that there was only a slight difference in the performance of each student when comparing the two programs. The mean accuracy rate of the 5 students exceeded class averages on 17 out of 20 occasions. These results support using both the Add-A-Word and Compu Spell programs for students with learning disabilities.

Summary

Teaching students a spelling strategy has a positive effect on spelling achievement in students with learning disabilities. The Harris et al. (1988), Dangel (1989), and Reid and Harris (1993) studies indicated that when students are in charge of their own weaknesses in spelling by sorting out words they need to study, they are much more successful. Also, they used a similar self-recording strategy which improved spelling accuracy. The Kearney and Drabman (1993) study examined the write-say procedure on spelling accuracy with students with learning disabilities. This study corresponded with the Dangel (1989) study in that students learned to practice words misspelled and increased the frequency of writing the words in each consecutive session.

The last study, McAuley and McLaughlin (1992) compared the Add-A-Word Spelling Program with the Compu Spell Program. The results indicated that both of these programs were comparable in increasing spelling performance. The students in this program outperformed the class average in 17 out of 20 occasions. As with the
other strategies, the Add-A-Word Program was similar in that it used the study, cover, copy, and compare method. These studies seemed to show a relationship in the area of using repetition as an integral part of increasing spelling performance.

**Orthographic Code**

The development of orthographic code has an apparent effect on a student's spelling achievement. If students are taught a strategy to learn the patterns of words they will increase their spelling skills. The following studies indicate a strong relationship between the development of orthographic code and reading and spelling achievement.

The first study, Laxon, Coltheart and Keating (1988) researched the effect of word friendliness on spelling. Children aged 8 to 10 were tested, since they could reasonably be expected to represent the ages at which orthographic knowledge has been shown to develop. These children were divided according to reading ability since the evidence suggests the effects of orthographic friendliness may differ at different stages of reading development. Orthographically friendly words include words which share the final three letters of four and five letter words, and words containing beginning letters, as well as ending letters. The children were tested randomly on a test containing 78 words and 80 non-words displayed on a computer. They were instructed to respond "yes" if a word was displayed or "no" if a non-word was displayed. The children were next asked to read the word. They were told to read the non-words as best as they could. One month later the students were given a spelling test on the same words, with words being presented before non-words.

The results indicated that orthographically unfriendly words proved to be significantly more difficult than orthographically friendly words to read and spell. That is, words that have many similar neighbors proved easier to read and spell. Although, good readers showed less reliance on word friendliness and more evidence of accurate use of grapheme-phoneme correspondence rules. The results indicated that children find common orthographic sequences easier to read and spell before they have learned

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to use grapheme-correspondences consistently.

The next study, Nulman and Gerber (1984) examined qualitative as well as quantitative changes in spelling performance when using a contingent imitation and modeling procedure. The authors hypothesized that by measuring qualitative changes in performance and by allowing a number of trials rather than achievement to vary, evidence would be obtained to support a problem-solving model of spelling acquisition. The subject in this study was Joe (pseudonym) an eight year old student with a learning disability attending regular second grade at a California elementary school.

The following procedure was used for Joe. He was given a pretest of ten words from the Slosson Oral Reading Test. If he spelled a word correctly, he was told he had spelled it right. But, if he misspelled a word he was told "This is how you spelled the word." The word was then written exactly the way he spelled it. After that, he was shown the correct spelling and was required to copy the right spelling. No colored pencils or other cueing stimuli were used to highlight his errors. During the learning trials Joe was presented the words orally and then instructed to: (a) say the words and (b) write them on a piece of paper. There were a total of seven learning trials which took 10-15 minutes per trial. These trials were followed by a posttest. Every time he spelled a word correctly, he was given a card containing that word. He was also able to trade the cards for reinforcers such as candy, gum or playing a special game.

The results indicated that Joe improved his spelling on phonetically regular words as a function of contingent imitation and number of trials. On the sixth and seventh learning trials, he spelled 90 percent of the words correctly. Then on the posttest, he spelled all of the words correctly. However, on the test for transfer, using marginally different words, he only spelled three words correctly. This was only slightly better than his initial performance on the original list. These results mean that the effects of contingent imitation of misspellings and modeling failed to generalize to highly similar words. A qualitative analysis of errors revealed improved ability to segment the phonemic string and choose logical and sometimes correct grapheme options. This
study indicated that Joe's spelling attempts did not improve only in the sense that more letters were correctly written on successive trial. Instead, spellings revealed that he increasingly applied different kinds of orthographic information with varying degrees of success.

In a similar study, Peterson and Haines (1992) investigated the effect of teaching children orthographic analogies based on onset and rime units (words that rhyme) and whether or not proficiency in the detection of onset and rime lead young children to become aware of phonemes. This study consisted of 48 kindergarten students randomly selected from six regular kindergarten classrooms in the Saskatoon Public School District. Before the training sessions began, the students were all tested in the areas of segmentation ability, letter sound knowledge, and word recognition by analogy. The students were placed in groups of high, middle, and low in each of these three areas. Training took place in 15-minute sessions for a maximum of seven sessions over a one-month period. During these sessions, 10 different rime units were introduced. At the end of the training sessions, posttests were administered to all of the children in the areas of letter-sound knowledge, segmentation ability, and word recognition.

This study deemed many different results. First, the low segmenter group showed almost no ability to use analogies to read unknown words prior to the analogy training. The analogy training did not significantly improve these children's ability to read by analogy, although it did result in an improvement in their segmentation ability. The middle group made the most significant gains in the areas of word reading by analogy and letter-sound knowledge. Significant gains were also seen in the segmentation task in the middle group. The high group showed similar results to the middle group although it was moderated by ceiling effects. This study supports the implementation of onset and rime units in beginning reading and may indicate how rhymes contribute to children's awareness of phonemes. These spelling patterns may also have an effect on spelling development.
In the fourth study, Trieman, Berch, Tincuff, and Weatherston (1993) explored the effects of syllabic consonants on children's spelling by conducting two experiments. The first experiment was designed to investigate children's spelling of stressed syllabic /r/. In order to examine the age factor, the subjects of this study were kindergarteners, first graders, and second graders. The stimuli were 20 words and 20 nonwords, all monosyllabic. Each group of children took part in two sessions, one session was devoted to words and the other session to nonwords. The students were told each word or nonword and were expected to spell it. The second experiment examined children's performance on unstressed syllables in words containing at least two syllables. The subjects were 24 first graders and 22 second graders. The stimuli were 38 two-syllable words with stress on the first syllable. The children were tested on eighteen words in the first session and twenty words in the second session. The students were told to spell each of the words during the two sessions.

The results of the first experiment revealed the use of vowels in spelling increased as the grade level increased. Also, children were more likely to include a vowel in real words than in nonwords. Difficulties with syllabic /r/ basically affect the vowel and do not extend into the consonant. Performance also improved across grades. These results indicate that children attempt to represent the phonological forms of words when they spell and that they code words such as sir and sip differently. The results of the second experiment revealed that first graders were more likely than second graders to omit vowels in the unstressed second syllables. These results show that linguistic factors play an important role in learning to spell. Children's spellings show the nature of children's phonological representations. The authors concluded that the results raise questions about the relationship between reading and spelling.

The next study Lie (1991) focused on four research questions: (a) will a systematic training program in word analysis in the fall term of Grade 1 lead to higher achievement in reading and spelling at the end of Grade 1?; (b) will the training in word analysis in the fall of Grade 1 show continued effects on reading and spelling at
the end of Grade 2?; (c) is there any difference between training in sequential analysis and training in positional analysis in short- and long-term effects on reading and spelling?; (d) will children with low intelligence profit more from training in word analysis than children with average or high intelligence? The subjects were 208 students enrolled in first-grade classes in Halden (Norway) at the time of the study. The training sessions for the three groups included daily sessions of 10-15 minutes of exercises. The groups consisted of a positional analysis group, a sequential analysis group, and a control group.

The results of this study suggested that a systematic training program for stimulating skills in word analysis in first-grade children facilitates both reading and spelling acquisition. It was also shown that training in sequential analysis is a more effective way of teaching word analysis than training in positional analysis. Another interesting finding was evidence that the students with low general intelligence gained more from the training program than the pupils with average or high intelligence.

In the final study, Fischer, Shankweiler, and Liberman (1985) hypothesized that educated adults who differ in spelling ability on conventional spelling tests differ correspondingly in the knowledge of linguistic sensitivity. Linguistic sensitivity is the ability to grasp the inherent regularities at various levels of linguistic representation and the ability to use this knowledge in reading and writing words. In this study, a group of 88 under-graduate psychology students volunteered to participate in this study. Out of the students, two groups were chosen, a group of 18 good spellers and a group of 20 poor spellers. The students were tested in three areas: (a) spelling production task, (b) spelling recognition task, and (c) spelling subtest of the Wide Range Achievement Test. The students' tests were analyzed for word errors, segment errors, and substitution errors. A second experiment was performed using 15 poor spellers and 15 good spellers. Tasks were given to evaluate specific metalinguistic and nonlinguistic abilities relating to spelling.

The results of the first experiment suggested that linguistic factors play an
important role in spelling. Spelling was most accurate in cases where the underlying morphophonemic structure was reflected in the phonemic structure of the word. That is, spelling was most accurate when the orthographic rules were more apparent in the word. Spelling became more difficult when phonological and orthography rules became more obscure in the word. The results of Experiment 2 revealed that good spellers were consistently more sensitive than poor spellers to the structural principles in nonwords. The finding that good spellers were able to derive the correct spelling for the nonwords suggested that their earlier success in spelling the real words was not entirely the result of having memorized the words.

Summary

The results of these studies indicate a strong relationship between the development of orthographic code and reading and spelling achievement. Children are better able to spell orthographically friendly words than orthographically unfriendly words (Laxon et al., 1988). Students learn the patterns of the words and generalize them to other words. If students are taught strategies to analyze their incorrect spellings of words, they can increase their ability to spell orthographically similar words (Nulman & Gerber, 1984). Yet a similar study, Peterson and Haynes (1992) investigated the effect of teaching onset and rime units in young students. It was evidenced that word analogy, segmenting, and rime units all improve a child's ability to read and spell.

Another significant study, Trieman et al. (1993) explored the effects of syllabic consonants on a child's spelling achievement. This study evidenced a strong relationship between reading and spelling. Due to the relationship between reading and spelling, word-analysis training can help increase spelling achievement. Correlating this study was Lie (1991), who also found a relationship between reading and spelling acquisition while using word-analysis training. Another study showing the importance of orthography on spelling was Fischer et al. (1985). They found that good spellers were more sensitive to the structure of words. All in all, these studies present
strong evidence that teaching syllable types and syllabication rules in a reading and
spelling program will positively affect spelling achievement.

Phonemic Awareness

Phonemic awareness is an important aspect in the development of reading and
spelling. In school, children need to acquire the skill of phonemic awareness in order to
achieve in reading and spelling. The following studies examined the importance of
phonemic awareness and how phonemic awareness training can improve both reading
and spelling achievement.

In the first study, Ball and Blachman (1991) evaluated the effects of training in
phonemic segmentation and of instruction in letter names and letter sounds on
kindergarten children's reading and spelling skills. This study consisted of 90 students
from three urban public schools in the United States. These students were divided into
three groups. The first group received training in segmenting words into phonemes, as
well as training in sound letter correspondence (phoneme awareness group). The
second group received training only on letter names and letter sounds (language
activities group). The third group was the control group which received no training.
At the end of the seven week training period, the students were retested on phoneme
segmentation, alphabet letter names and sounds, and the Woodcock Reading Mastery
Word Identification Subtest.

The results indicated that the children who received segmentation training
improved significantly, not only in segmenting trained items, but also in segmenting
items that were similar and different. The other two groups showed significant gains in
segmenting, although these gains were significantly smaller than the phonemic
awareness group. Both the phoneme awareness group and the language activities
group achieved significantly higher letter-sound scores than the control group, but did
not differ from each other. It was found that the letter-sound knowledge by itself did
not improve segmentation skills. Also, students in the language-activities group were
significantly less proficient in word identification than children in the phoneme
awareness group. These results indicated that letter-name and letter-sound training, when provided without phoneme awareness training, was not sufficient to improve early reading skills. The spelling results were similar to the reading results. That is, the group that received segmentation training plus letter-name and letter-sound instruction spelled significantly better than either the language activities group or the control group. These results show a strong correlation between spelling achievement and phoneme awareness training.

In a similar study, Griffith (1991) examined the effects of phonemic awareness and word-specific information on spelling development. This study also explored the relationship between phonemic awareness and the acquisition of memorized spellings. The subjects in this study were 96 first-graders and 87 third-graders attending a public school in a southwestern state. All children in the study spelled the same set of 40 words. In the testing procedure, the children were instructed to listen as the word was said and used in a sentence, and then to write the word. When the phonemic awareness test was given, the children were instructed to circle the correct spelling for each word as it was pronounced by the researcher. Comparisons of the quality of the spellings of these two groups were made by calculating the percentages of consonant sounds in each word represented in the children's spellings of the words.

The results indicated that phonemic awareness had a more powerful effect in the first-grade group. In the third-grade group, word specific information made a stronger influence on spelling, which suggested memorized orthographic units played an important role at this level. The children in first-grade relied on an invented spelling strategy because they were generally poor at remembering correct spellings for words. In contrast, the third-grade children were approaching mastery of phonemic awareness and have already stored the correct spellings of many words. The children in the two high phonemic awareness groups tended to spell words correctly. They appeared better able to complete an analysis of the words they spelled, showing a tendency to represent the vowel beyond the first syllables in the words. Also, low phonemic
awareness children's spelling, when pronounced, sounded less like the target word than the high phonemic awareness group.

In a third study, MacDonald and Cornwall (1995) reassessed as many of the students as possible who had participated in an earlier study of phonological ability. They tried to determine whether performance on reading, spelling, and phonemic deletion tasks were predictive of reading and spelling performance 11 years later. In 1982, 58 kindergarten students were chosen at random from four city schools in Halifax, Nova Scotia, to participate in a study addressing the relationship between phonological awareness and reading and spelling skills. Then in 1993, 37 of the original 58 students participated in a follow-up study. All the subjects were administered the following tests: (a) the AAT-a 40 item sound deletion test based on Rosner and Simon's original item analysis, (b) Peabody Picture Vocabulary Test-Revised, (c) Reading subtest of the Wide Range Achievement Test-Revised, (d) Spelling subtest of the Wrat-R, and (e) Word Attack subtest from the Woodcock Reading Mastery Tests-Revised (WRMT-R), and (f) the Passage Comprehension subtest of the WRMT-R.

The results showed that although performance on recognition vocabulary measures was reasonably stable over the 11-year span, it did not predict word identification or spelling skills. None of the tests at six years of age predicted reading comprehension achievement at age 17 years. However, the AAT given in kindergarten predicted word identification and spelling skills at age 17 years better than did kindergarten achievement, in word identification and spelling. Phonological awareness at 6 years of age was relatively more stable over this developmental time span, as well as predicting reading and spelling achievement. These findings support implementing phonemic awareness instruction in the school setting.

In the next study, Bryant, MacLean, Bradley, and Crossland (1990) tested the relationship between various forms of phonological awareness (detection of rhyme and alliteration and detection of phonemes) and children's reading. Three predictions were
made: Model 1 - the experience of learning to read leads to phoneme awareness and that neither of these is connected to awareness of rhyme. Model 2 - a strong relation exists between children's early phonological skills, such as rhyme and alliteration, and later ones like phoneme detection, since one set of skills leads to the other, and Model 3 - a strong relation exists between children's early sensitivity to rhyme and their progress in reading, which will hold even after the effects of differences in the children's success in detecting phonemes have been controlled. The subjects were 64 children tested in a time period over two years. At the start of the study the average age of the subjects was 4 years 7 months and at the end of the study the average age was 6 years 7 months. The students were given tests for rhyme and alliteration and for phoneme detection. The final tests given at age 6 years 7 months consisted of the France Primary Reading Test, Schonell Graded Word Reading Test plus extra words, Schonell Spelling Test Form A plus extra words, and the WISC-R Arithmetic Test.

The results indicated that the measure of rhyme or alliteration detection and one of phoneme detection, accounted for above 65%, and in some cases for as much as 71%, of the variance in reading. This evidenced a connection between early phonological skills and the child's progress in reading later on. Also, the evidence suggested that rhyme and alliteration affected reading in two ways meaning both Models 2 and 3 are partially correct. The results also indicated that sensitivity to rhyme and alliteration are essential in the development of phoneme detection, which plays an important role in reading. Also, sensitivity to rhyme helped children to group words with common spelling patterns which aided in the reading process. These findings show a direct relationship between learning patterns and reading and spelling acquisition.

In yet another study, Byrne and Barnsley (1991) evaluated a new program designed to teach young children about phonological structure. This study attempted to answer two questions: (a) Does the program raise levels of phonemic awareness on phoneme identity tests? and (b) Is there evidence that successful recognition of
phoneme identity transfers to reading activities? This study consisted of 124 students from four preschools. All the students were pretested in the areas of verbal facility, rhyme recognition, and phoneme identity. In the phonemic awareness program nine phonemes were targeted. The training program lasted 12 weeks, with one 25-30 minute training session per week.

The results evidenced that recognition of phonemic identity can be trained with the program used in the study. The results also indicated that experimental subjects improved more on trained sounds relative to control subjects. Yet, an increase in the level of phonemic awareness occurred with untrained as well as trained sounds. Also, the children managed initial-phoneme judgments better than final-phoneme judgments. According to the word-recognition test, most of the children who demonstrated phonemic awareness and knew relevant letter sounds could use their skill to decode unfamiliar printed words. These results reveal that phonemic awareness training is an important aspect in learning to read and spell.

The last study, Castle, Riach, and Nicholson (1994) researched the effects of phonemic awareness instruction within a whole language program. Two separate experiments were conducted in this study. The first experiment focused on whether the acquisition of phonemic awareness training had a greater effect on learning to spell than did the regular writing program alone. This experiment involved 30 children attending three primary schools in Auchland, New Zealand starting in their first few months of school. Phonemic awareness skills were taught twice a week for a period of ten weeks. Each lesson covered specific topics and activities aimed at increasing phonemic awareness. The topics covered in the lessons included phoneme segmentation, phoneme substitution, phoneme deletion, and rhyme. A variety of games were used to teach these skills. The second experiment focused on the effects of phonemic awareness training on reading acquisition. This experiment involved 51 beginning readers in five schools. The phonemic training and alternative trainings were taught for 20 min. each week, for a period of 15 weeks. The phonemic awareness group focused
on segmentation and blending skills. The activities used during this training were alliteration, rhyming, and segmentation activities.

The results of the first experiment suggested that phonemic awareness training contributed to spelling development by enabling children to use phoneme-grapheme correspondence rules. Also, the ability to link sounds and letters as revealed in the phonemic spelling analysis, showed good phonemic similarity, although the children's writing was often orthographically incorrect. The results of the second experiment indicated that the phonemic training program did have an effect on reading skills. The phonemic awareness group's scores on the phonemic awareness test were considerably higher than those of the other groups. This group also did a better job of reading pseudowords and on the dictation test. These results support teaching phonemic awareness skills to increase both reading and spelling effectiveness.

**Summary**

Phonemic awareness plays an important role in both reading and spelling development. Teaching phonemic awareness skills can greatly affect spelling achievement. In one study, Ball and Blachman (1991) found that children who received segmentation training plus letter-name and letter-sound instruction spelled significantly better than students who did not receive the training. Another study, Griffith (1991) examined the effects of phonemic awareness and word specific information on spelling development. They found the spellings of children with low phonemic awareness, sounded less like the target word than the spellings of children with high phonemic awareness. Both the studies (Ball & Blackman, 1991, and Griffith, 1991) found phonemic awareness an integral factor in students' ability to spell words accurately. In a third study, MacDonald and Cornwall (1995) found that phonemic awareness skills present at the age of 6 years did not predict spelling performance 11 years later. This finding supports implementing phonemic awareness training in the school setting. Phonemic awareness is a skill that can be developed over a student's school years.
In a similar study, Bryant, NacLean, Bradley, and Crossland (1990) found a connection between early phonological skills and a child's progress in reading later on. Also, sensitivity to rhyme aided in the reading process by helping children to group words with common spelling patterns. These results show a direct relationship between learning patterns and a student's ability to acquire reading and spelling skills. Yet another study evaluated a new program designed to teach young children about phonological structure (Byrne & Barnsley, 1991). They found that most of the children who demonstrated phonemic awareness and knew relevant letter sounds could use their skills to decode printed words they had not seen before. In the last study, Castle, Riach, and Nicholson (1994) examined how phonemic awareness training effected a whole language program. They found that the phonemic awareness training aided in spelling development by enabling children to use phoneme-grapheme correspondence rules. All in all, the evidence of these studies support teaching phonemic awareness skills to increase both reading and spelling achievement.

Conclusions

Developing an effective reading and spelling program for students with learning disabilities can prove to be a difficult task. Many factors need to be examined when developing a reading and spelling program for these diverse learners. The first factor examined was that students with learning disabilities have unique learning differences. Students with learning disabilities develop orthographic code slower than do students without learning disabilities (Zecker, 1991). These students need to be taught orthographic skills to increase their reading and spelling accuracy. In a similar study, Foorman and Liberman (1989) found that good readers have more advanced phonetic skills than do poor readers. Also, good spellers spelled words phonetically almost twice as often as poor spellers. Students with learning disabilities need to be taught a strategy to help them utilize a structured systematic approach to spelling tasks (DeMaster et al., 1986). Students with learning disabilities benefit if they are taught at their instructional level and are not given more than three spelling words each day.
(Bryant et al., 1981; Morris et al., 1995). All of these findings suggest a need to plan an effective reading and spelling program to meet the unique needs of students with learning disabilities.

Numerous strategies have been developed in an attempt to meet the needs of students with learning disabilities. The Harris et al. (1988), Dangel (1989), and Reid and Harris (1993) studies all looked at teaching students a study strategy to increase spelling effectiveness. In these three studies, students were put in charge of their own spelling weaknesses by sorting out the words they needed to study. Students with learning disabilities often have difficulty studying spelling words due to lack of prioritization skills. The Kearney and Drabman (1993) study examined the write-say procedure on spelling with students with learning disabilities. This study strategy also teaches students with learning disabilities to prioritize their spelling words to increase spelling effectiveness. In the McAuley and McLaughlin (1992) study, the Add-A-Word Spelling Program was compared to the Compu Spell Program. Both of these strategies relied on repetition to increase spelling effectiveness. All these studies seem to rely on teaching students a spelling study skill.

Teaching a study strategy is an important aspect in achieving success in spelling, however, when used alone is not adequate. Students with learning disabilities need to receive orthographic code training to achieve even greater success in reading and spelling. Children learn to spell orthographically friendly words better than orthographically unfriendly words (Laxon et al., 1988). That is, students learn the patterns of the words and generalize them to other words. Also, teaching word analogy, segmenting, and rime units all improve a student's ability to read and spell (Peterson & Haynes, 1992). Another two studies evidenced a relationship between reading and spelling acquisition while using word analysis training (Trieman et al., 1993; Lie, 1991). In a related study, (Fischer et al., 1995) found good spellers are more sensitive to the orthographic structure of words. All of these findings suggest teaching syllable types and syllabication rules in a reading and spelling program can
Another factor that can make an impact on spelling achievement is the development of phonemic awareness. Students with high phonemic awareness tend to spell words more accurately than students with low phonemic awareness (Griffith, 1991). This finding suggests a need to implement phonemic awareness training in the classroom. Letter-name and letter-sound training without phoneme awareness training is not sufficient to improve early reading skills (Ball & Blachman, 1991). Also, children who received segmentation training plus letter-name and letter-sound instruction spell significantly better. So not only do segmentation training and phonemic awareness training effect reading achievement, but they also have a significant effect on spelling achievement.

Similar evidence has revealed a connection between early phonological skills and a child's reading later on (MacDonald & Cornwall, 1995; Bryant et al., 1990). This evidence also supports teaching phonological awareness skills in a reading and spelling program. Since students with learning disabilities develop phonemic awareness skills at a slower rate it would be beneficial to give them even more phonemic awareness training than students who develop these skills more easily. Phoneme awareness training enables students to use phoneme-grapheme correspondence rules, therefore, positively affecting spelling development. All in all, this evidence supports the concept of teaching syllable types and syllabication rules in reading to aid in increasing spelling achievement.
CHAPTER 3

Many students with learning disabilities have difficulty in the areas of reading and spelling. These problems may be attributed to several different factors. The first factor is that students with learning disabilities acquire reading and spelling skills differently than students without learning disabilities. In order to address these differences, a unique reading and spelling program should be implemented. The second factor involves the development of orthographic code in students with learning disabilities. The development of orthographic code is an integral component of learning to read and spell. Students need to acquire the knowledge of word structure so they can spell more effectively. The last factor necessary for spelling development is phonemic awareness. Students with learning disabilities develop phonemic awareness at a slower rate causing them to struggle in the reading and spelling areas. A reading and spelling program should be implemented to address these differences.

Teaching students with learning disabilities syllable types and syllabication rules will help these students become aware of both the orthographic code and phonemic structure of words. In this study, two syllable types along with one syllabication rule were taught in a reading program to observe the causal relationship between learning syllable types and syllabication rules and spelling achievement. The syllable types and the VC/CV syllabication rule were taught in a reading program and analyzed to see if an effect on spelling achievement exists.

Methods

Participants

Eight students participated in this study. However, one student moved to another school district halfway through the study. As a result, data on seven students will be reported. All of the subjects were fifth-grade students with learning disabilities attending a rural, low-socioeconomic school in western-lower Michigan. The subjects consisted of six boys and one girl ranging in age from 10.4 years to 11.6 years with a mean age of 11.2 years. The Intelligence Quotient scores of the students ranged from
74 to 85 with a mean score of 83 on the Weschler Intelligence Scale for Children-Revised. All the students were tested at the end of the 1996-1997 school year on the Wide Range Achievement Test (WRAT) spelling test. The scores of the WRAT spelling test ranged from the 2.1 grade equivalence level to 2.9 grade equivalence level with a mean of 2.4 grade equivalence level.

Setting

This study took place in a resource room setting. There were 12 desks placed in four rows with three chairs in each row. The room was shared by two resource room teachers, and contained two teacher desks in two corners of the room. In another corner of the room was an oblong table with six chairs. In the front of the room was a large chalkboard where most of the direct instruction took place. The students left their classrooms to come to the resource room each day. All the students in this study were in the resource room during the phonics and reading times.

Intervention

The intervention took place within the resource room setting. The intervention consisted of two four-week instructional phases. In the first phase the closed syllable was taught, and in the second phase the silent-e syllable was taught. Each phase was conducted in an identical manner. Each training session was 30-40 minutes in length on Tuesday, Wednesday, Thursday, and Friday of each week. Tests were given each Monday. In each phase the following instructional procedure was followed. First the rules for the syllable type were introduced. When students were able to recite the rules of the syllable the following activities were implemented. In the first activity called the sorting activity, students were given a syllable card, an index card containing either closed syllables or not closed syllables. The students then had to bring each card to the front of the room and place them under the closed or not closed column written on the board. As the students did this they had to tell why the syllable on the syllable card was closed or not closed by reciting the rules for closed syllables. The same sorting activity was used in the silent-e phase, although students had to distinguish between silent-e
syllables and closed syllables. In the second activity called the syllabication activity, students were also given words containing the syllable types introduced and taught to break them into syllables. The syllabication rule taught was the VC/CV syllabication rule. The VC/CV rule states: when two or more consonants stand between two vowels, divide between the consonants keeping blends and digraphs together.

In the third activity called the matching activity, students had to match the first and second syllables to form a word (e.g. 'com' matched with 'pete' forms the word 'compete'). This activity was accomplished by both matching syllables written on cards and by completing worksheets containing unmatched syllables. The fourth activity was called the detective game. Words, containing the syllables being taught were written on sentence strips. Five sentence strips were placed in the front of the room. The students were instructed to read each sentence strip aloud. Then four of the strips were read by the teacher while the students followed along at their seats. Then one student would be picked to read the sentence that had not been read. Along with these direct-instruction activities, worksheets from Megawords (Johnson & Bayrd, 1982) were also given to practice the syllable types. These worksheets implemented sorting, matching, syllabication, and fill-in-the-blank strategies.

Measurement Instruments

During each phase of instruction, four ten-word spelling tests were administered. The first ten-word test given at the beginning of each phase was the pretest. The last test or posttest which was given at the end of each four-week period contained the original ten pretest words. Tests 2, 3, and 4 each contained words following the same syllable pattern but were different than the words on the pretest. The words on the spelling tests in the first phase all contained two closed syllables. The words on the spelling tests for the second phase all contained a closed syllable followed by a silent-e syllable. The tests were evaluated in two ways:

Word accuracy test. The tests were evaluated for the number of words correct. The word was counted correct if the student had spelled every letter correctly. That is,
in the first phase every letter of the two closed syllables needed to be spelled correctly for the word to be marked correct. The word bandit would have to be spelled 'bandit' for the word to be counted as correct. In the second phase, both the closed and silent-e syllable in each word had to be spelled correctly for the word to be counted as correct. The tests were calculated for number of words correct. For example, if three words were spelled correctly the student would be given credit for 3 out of 10 words correct. This means the student would have 30% accuracy on the test. All of the students' scores were calculated and an average percent for all seven students was determined.

**Syllable accuracy test.** The tests were evaluated for the number of syllables correct. That is, each syllable in the word that follows the rule for that syllable were counted as correct. The syllable was marked correct if all the sounds for that syllable were correct (e.g. 'caktus' would be marked as two syllables correct, even though the word should be spelled 'cactus'). That is, the 'c' can be written 'k' because c and k can both have the |k| sound. Also 'c' and 's' can be interchanged because 'c' can have both the |s| and |k| sound (e.g. 'concede' would be marked as two syllables correct, even though it should be spelled 'concede'). In the first phase, students could earn a point for each closed syllable spelled correctly with a total of 20 points possible per test. In the second phase, students could earn a point for each silent-e syllable spelled correctly with a total of 10 points possible for each test. For example, in the word 'empire' only the silent-e syllable 'pire' would count as a syllable correct. If a student had 5 out of 10 silent-e syllables correct, the student would have an accuracy average of 50% on the silent-e test. As in the word accuracy test, the average percent for all the students was determined by calculating the accuracy average for the seven students.

**Procedures**

The following will describe the procedure followed during both the closed syllable phase and the silent-e phase. On the first day of instruction, Monday, a ten word pretest was given containing the syllable type being taught. In the first phase, each word on the pretest contained two closed syllables, while in the second phase each
word on the pretest contained a closed syllable followed by a silent-e syllable (focusing on the silent-e syllable). A closed syllable has only one vowel, ends in a consonant, and has a short-vowel sound (e.g. con, in, rep, wel). A silent-e syllable has one vowel followed by a consonant followed by an 'e' (e.g. vade, tane, treme, flate). On the Mondays of the second, third, and fourth week of instruction a ten-word spelling test, each containing different words following the same pattern was given. The last test administered contained the same words as in the original pretest.

On the instruction days, Tuesday, Wednesday, Thursday, and Friday, many activities were implemented to teach the closed and silent-e syllables and the VC/CV syllabication rule. The instruction period each day lasted between 30 and 40 minutes in length depending on the length of the activity. In both the closed syllable phase and the silent-e phase, the first step was to teach the rules for the syllable type. Then four teacher-directed activities were implemented: (a) sorting activity, (b) syllabication activity, (c) matching activity, and (d) detective game activity. Practice worksheets were given following direct-instruction including sorting, matching, and fill-in-the-blank activities. At the end of the study the students' spelling tests were evaluated in two ways: the word accuracy test and the syllable accuracy test.

Experimental Design

The effects of teaching students two syllable types and one syllabication rule on spelling achievement were examined in this study. Both the closed syllable and silent-e syllable were analyzed for word accuracy and syllable accuracy by calculating the mean percentage of accuracy of the seven students involved in this study.

Results

Listed in Table 1 are the mean percentage scores summarizing the word accuracy and syllable accuracy performances of the students participating in the study.

Closed Syllable Test

To compare the pretest and posttest scores of the closed syllable test, shown in Figure 1, a mean percentage was calculated and indicated that: (a) the scores on the
posttest were substantially higher than the pretest on the word accuracy test (from 10% word accuracy to 26% word accuracy), and (b) the scores on the posttest were substantially higher than the pretest on the syllable accuracy test (from 34% syllable accuracy to 57% syllable accuracy). Test 2, Test 3, and Test 4 on the word accuracy test showed the most gain between the pretest and Test 2 (from 10% word accuracy to 27% word accuracy). Whereas, on the syllable accuracy test the greatest increase was from Test 2 to Test 3 (from 35% syllable accuracy to 46% syllable accuracy), and from Test 4 to Test 5 (from 48% syllable accuracy to 57% syllable accuracy).

Silent-e Syllable Test

To compare the pretest and posttest scores of the silent-e syllable test, as shown in Figure 2, a mean percentage was calculated and indicated that: (a) the scores on the posttest were substantially higher than the pretest on the word accuracy test (from 7% word accuracy to 41% word accuracy), and (b) the scores on the posttest were substantially higher than the pretest on the syllable accuracy test (from 19% syllable accuracy to 61% accuracy). In Test 2, Test 3, and Test 4 on the word accuracy test the most gain was shown between the pretest and Test 2 (from 7% word accuracy to 27% word accuracy). Whereas, on the syllable accuracy test the greatest increase was from the pretest to Test 2 (from 19% syllable accuracy to 39% syllable accuracy), and from Test 3 to Test 4 (from 39% syllable accuracy to 61% syllable accuracy).

Discussion

This study was designed to see whether teaching syllable types and a syllabication rule in a reading program would positively effect spelling achievement for students with learning disabilities. The words in the spelling tests were only practiced during a phonics program aimed at teaching students to identify words containing the closed and silent-e syllables. These words were not given to students as spelling words so students were unable to study for these words. This study was performed to find out whether teaching the syllable types and a syllabication rule in reading would have a positive effect in a student's spelling achievement. Some interesting findings have been
observed as a result of this study.

The results indicated a substantial increase in both word accuracy and syllable accuracy from pretest to posttest scores for both the closed syllable test and silent-e syllable test. There was a greater increase from pretest to posttest scores for word accuracy and syllable accuracy on the silent-e syllable test than on the closed syllable test. On the closed syllable test there was a 16% increase on word accuracy and a 23% increase in syllable accuracy, while on the silent-e syllable test there was a 34% increase in word accuracy and a 42% gain in syllable accuracy. This increase may be due to the students becoming more able to identify patterns as they learned the syllable types. Since the silent-e syllable was taught last and showed a greater gain from pretest to posttest, students may have become better able to observe the pattern in the words. From learning the closed syllable pattern first, the students may have learned strategies to sort out syllables enabling them to spell the syllables more accurately.

Another finding seems to indicate evidence that teaching syllable types and syllabication rules in a reading program can positively effect spelling achievement. This is evidenced by the fact that the students showed a gradual upward trend of scores after each week of instruction for both the closed syllable and silent-e syllable. A few downward fluctuations appeared, although for the most part the scores showed an increase as instruction was presented. Slight fluctuations in test scores may have occurred due to factors such as student motivation or individual test difficulty (words containing blends, silent letters, schwa vowels). The gradual upward trend of test scores seems to indicate that students are internalizing these patterns which positively effects their spelling achievement.

Yet, the most interesting observation is that the syllable accuracy test showed a substantially higher gain than the word accuracy test in both the closed syllable and silent-e syllable tests. In the closed syllable test, the word accuracy score showed a gain of 16% while the syllable accuracy score showed a gain of 23% from pretest to posttest scores. In the silent-e syllable test, the word accuracy score showed a gain of
34%, while the syllable accuracy score showed a gain of 42% from pretest to posttest scores. The syllable accuracy test seems to be a more accurate account of a student's progress than the word accuracy test due to the fact it more accurately represents the student's actual knowledge of the syllable type being examined. For example, if a student spells the word bandit as 'bandut', the word accuracy test would count the whole word as incorrect, whereas in the syllable accuracy test the student would get credit for one correct syllable. A student could get seven syllables right in ten words but may only have one actual word spelled correctly. The score on the word accuracy test does not reveal a student's progress on the syllable type being tested as accurately as the syllable accuracy test. These results indicate that teaching syllable types and a syllabication rule may, in fact, positively effect students' with learning Disabilities spelling achievement.

The role of syllable types and syllabication rules on spelling achievement needs to be pursued further to see if there is a need for teachers to implement this strategy into a reading and spelling program for students with learning disabilities. Due to the nature of students with learning disabilities differences in learning, new approaches need to be explored. Also, phonemic awareness and orthographic code have been evidenced to be strong influences on a student's success in spelling. Teaching syllable types relies heavily on phonemic awareness skills and a student's ability to recognize the structure or orthographic code of words. This study seems to provide evidence to support teaching syllable types and syllabication rules to students with learning disabilities.
References


and sensitivity to word structure. *Journal of Memory and Language, 24*, 423-441.


APPENDIX A: Tables & Figures
Table 1. Average percent accuracy for students with learning disabilities.

### CLOSED SYLLABLE TEST

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Accuracy</strong></td>
<td>10%</td>
<td>27%</td>
<td>33%</td>
<td>27%</td>
<td>26%</td>
</tr>
<tr>
<td><strong>Syllable Accuracy</strong></td>
<td>34%</td>
<td>35%</td>
<td>46%</td>
<td>48%</td>
<td>57%</td>
</tr>
</tbody>
</table>

### SILENT-E SYLLABLE TEST

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Test 2</th>
<th>Test 3</th>
<th>Test 4</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word Accuracy</strong></td>
<td>7%</td>
<td>27%</td>
<td>26%</td>
<td>37%</td>
<td>41%</td>
</tr>
<tr>
<td><strong>Syllable Accuracy</strong></td>
<td>19%</td>
<td>39%</td>
<td>39%</td>
<td>61%</td>
<td>61%</td>
</tr>
</tbody>
</table>
Figure 1. Students' syllable accuracy and word accuracy scores on weekly tests.
Figure 2. Students' syllable accuracy and word accuracy scores on weekly tests.
APPENDIX B: Worksheets
WORKSHEET 2-A

A syllable is a group of letters that has a single vowel sound. Some syllables are closed.* There are three things you must remember about the closed syllable:

1. It has only one vowel.
2. The vowel has a short sound.
3. It ends in a consonant.

Circle only those syllables below that are closed syllables. Then copy them under the headings below according to their vowel sound. Pronounce the syllables, giving the vowel its short sound.

gos    pret    trum    cade    lish
fle    sud    op    flan    prob
tal    cu    hus    sel    tain
vict    tist    caul    ject    ap
blos    lete    chil    tact    ple

/ â / as in apple  / û / as in igloo  / ô / as in octopus

/ ʌ / as in umbrella  / ə / as in Ed

* A summary of the six types of syllables is on page 102.
Many words are made by putting two closed syllables together. The vowel sound in these syllables will be ________________. Mark the vowels short (-); then pronounce the syllables and combine them to read the whole word. Circle the syllables as shown.

<table>
<thead>
<tr>
<th>cŏn</th>
<th>tāct</th>
<th>contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>nut</td>
<td>meg</td>
<td>nutmeg</td>
</tr>
<tr>
<td>mas</td>
<td>cot</td>
<td>mascot</td>
</tr>
<tr>
<td>pub</td>
<td>lish</td>
<td>publish</td>
</tr>
<tr>
<td>con</td>
<td>vict</td>
<td>convict</td>
</tr>
<tr>
<td>hec</td>
<td>tic</td>
<td>hectic</td>
</tr>
<tr>
<td>kid</td>
<td>nap</td>
<td>kidnap</td>
</tr>
<tr>
<td>ati</td>
<td>tic</td>
<td>attic</td>
</tr>
<tr>
<td>ad</td>
<td>dress</td>
<td>address</td>
</tr>
<tr>
<td>con</td>
<td>test</td>
<td>contest</td>
</tr>
<tr>
<td>in</td>
<td>sect</td>
<td>insect</td>
</tr>
<tr>
<td>sel</td>
<td>fish</td>
<td>selfish</td>
</tr>
<tr>
<td>quin</td>
<td>tet</td>
<td>quintet</td>
</tr>
<tr>
<td>cac</td>
<td>tus</td>
<td>cactus</td>
</tr>
<tr>
<td>tal</td>
<td>cum</td>
<td>talcum</td>
</tr>
<tr>
<td>un</td>
<td>til</td>
<td>until</td>
</tr>
</tbody>
</table>

Fill in the blanks with one of the words from above.

1. kind of desert plant ______________________
2. chance for someone to win ______________________
3. thinking only of oneself ______________________
4. bug ______________________
5. type of powder ______________________
6. to carry someone off by force ______________________
7. a spice ______________________
8. person in prison ______________________
9. space just below the roof ______________________
10. tells where to send mail ______________________
WORKSHEET 2-F

Match the syllables to make a real word. Then say it as you write it.

<table>
<thead>
<tr>
<th>mag</th>
<th>vict</th>
<th>ress</th>
<th>wich</th>
</tr>
</thead>
<tbody>
<tr>
<td>tom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>net</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>magnet</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sip</td>
<td></td>
<td>sil</td>
<td></td>
</tr>
<tr>
<td>sel</td>
<td></td>
<td>ton</td>
<td></td>
</tr>
<tr>
<td>meg</td>
<td></td>
<td>let</td>
<td></td>
</tr>
<tr>
<td>fish</td>
<td></td>
<td>nap</td>
<td></td>
</tr>
</tbody>
</table>

Match the syllables to make real words.

<table>
<thead>
<tr>
<th>den</th>
<th>zel</th>
<th>trum</th>
<th>dom</th>
</tr>
</thead>
<tbody>
<tr>
<td>zel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>trum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dom</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>hus</th>
<th>tist</th>
<th>sel</th>
<th>nel</th>
</tr>
</thead>
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<tr>
<td>tist</td>
<td></td>
<td>sel</td>
<td>nel</td>
</tr>
<tr>
<td>sel</td>
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<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
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<th>tun</th>
<th>pet</th>
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<tr>
<td>band</td>
<td></td>
<td>tun</td>
<td>pet</td>
</tr>
<tr>
<td>tun</td>
<td></td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
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<th>nel</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td>prob</td>
<td>nel</td>
</tr>
<tr>
<td>prob</td>
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<td></td>
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</table>

<table>
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<tr>
<th>cac</th>
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<th>tress</th>
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</thead>
<tbody>
<tr>
<td>den</td>
<td></td>
<td>flan</td>
<td>tress</td>
</tr>
<tr>
<td>flan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tress</td>
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<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>sud</th>
<th>test</th>
<th>ac</th>
<th>lem</th>
</tr>
</thead>
<tbody>
<tr>
<td>test</td>
<td></td>
<td>ac</td>
<td>lem</td>
</tr>
<tr>
<td>ac</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lem</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unscramble these three-syllable words.

<table>
<thead>
<tr>
<th>tas</th>
<th>tic</th>
<th>fan</th>
</tr>
</thead>
<tbody>
<tr>
<td>tas</td>
<td></td>
<td>fan</td>
</tr>
<tr>
<td>tic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fan</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>lish</th>
<th>es</th>
<th>tab</th>
</tr>
</thead>
<tbody>
<tr>
<td>lish</td>
<td></td>
<td>tab</td>
</tr>
<tr>
<td>es</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tab</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
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<tr>
<th>bad</th>
<th>ton</th>
<th>min</th>
</tr>
</thead>
<tbody>
<tr>
<td>bad</td>
<td></td>
<td>min</td>
</tr>
<tr>
<td>ton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>min</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>lan</th>
<th>At</th>
<th>tic</th>
</tr>
</thead>
<tbody>
<tr>
<td>lan</td>
<td></td>
<td>tic</td>
</tr>
<tr>
<td>At</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>sin</th>
<th>con</th>
<th>Wis</th>
</tr>
</thead>
<tbody>
<tr>
<td>sin</td>
<td></td>
<td>con</td>
</tr>
<tr>
<td>con</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A silent-e syllable (VCe) has one vowel followed by a consonant followed by an e. The e is silent and makes the preceding vowel long (ace, hide, dome).

A closed syllable (VC) has only one vowel, ends in a consonant, and has a short-vowel sound (trōm, ēm, jēct).

The following syllables are either silent-e or closed. Write them in the correct columns.

<table>
<thead>
<tr>
<th>pire</th>
<th>pas</th>
<th>rise</th>
<th>con</th>
<th>trive</th>
</tr>
</thead>
<tbody>
<tr>
<td>cuse</td>
<td>tane</td>
<td>vade</td>
<td>pede</td>
<td>flate</td>
</tr>
<tr>
<td>trom</td>
<td>stag</td>
<td>wel</td>
<td>in</td>
<td>sume</td>
</tr>
<tr>
<td>en</td>
<td>ig</td>
<td>mem</td>
<td>treme</td>
<td>rep</td>
</tr>
</tbody>
</table>

Silent-e Syllables

1. __________
2. __________
3. __________
4. __________
5. __________

Closed Syllables

6. __________
7. __________
8. __________
9. __________
10. __________

Your teacher will dictate ten syllables. Repeat each syllable and write it under the correct column.

<table>
<thead>
<tr>
<th>Silent-e Syllables</th>
<th>Closed Syllables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Circle the silent-e syllables in the real words below.

empire    invade    contrive    extreme    consume
Match the syllables to make a real word. Then say it as you write it.

- **Im lete**
- **es mune**
- **ath pede**
- **stam cape**
- **con tume**
- **cos take**
- **mis plode**
- **ex fide**

- **trom vade**
- **con pole**
- **in bone**
- **tad crete**
- **ig tile**
- **com nite**
- **bap mune**
- **rep tize**

Reorder the syllables to make a recognizable three-syllable word.

- **sate com pen**
- **con cate fis**
- **fan in tile**
- **trate lus il**
- **in trate fil**
WORKSHEET 3-H

Match each word to its definition.

connive  a thin, soft layer of plant or animal tissue-
stagnate  to become stale and inactive
confiscate  to work together secretly
membrane  to take away

Fill in the blanks with the correct words from the list below.

1. The mucous __________________ is in your nose.
2. The water in the pond will _____________________ unless the dam is opened.
3. The ___________________ grew into a frog.
4. Our class spent all our time at the zoo in the ___________________ house watching the snakes.
5. The ___________________ called the ball a foul.
6. The horses ___________________d when they heard the gunshot.
7. She ___________________d about a room in the hotel.
8. The two teams ___________________d each other on the playing field.
9. The police officer will ___________________ the crook's gun and knife.
10. The bandits will ___________________ to rob the bank.
11. The Roman ___________________ ruled over many countries.
12. Patrick is not ___________________d to work very hard; he is lazy.

umpire  reptile  stampede  tadpole
incline  oppose  empire  membrane
stagnate  inquire  confiscate  connive
Title: The effects of teaching two syllable types and one syllabication rule on the spelling achievement of students with learning disabilities

Paper Type: (Choose only 1)  

- Project  
- Thesis  

Sem/Yr Completed: Fall 1997

Using the ERIC thesaurus, choose as many descriptors (5-7 minimum) to describe the contents of your paper.

1. learning disabilities  
2. spelling achievement  
3. syllabication  
4. phonemic awareness  
5. orthographic code

Abstract: Two to three sentences that describe the contents of your paper

The purpose of this study was to determine whether teaching two syllable types and one syllabication rule in a reading program would affect the spelling achievement of students with learning disabilities. The results showed a significant increase in spelling achievement for both the closed syllable spelling test and the silent-e spelling test. Also, the syllable accuracy test revealed the most significant effect on raising students' with learning disabilities spelling achievement scores.