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Effectiveness of Visual Imagery Versus Rule-based Strategies in Teaching Spelling to Learning Disabled Students

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ABSTRACT

The purpose of this study was to investigate the relative effectiveness of two approaches for teaching spelling. The subjects for this study were 28 upper elementary learning disabled students randomly assigned to one of two treatment groups. One group of students was taught spelling with a visual imagery mnemonic, while the other was taught spelling with rule-based spelling strategies. Students were evaluated on three separate dependent measures: (a) three 10-item unit tests administered every 8 to 10 lessons, (b) a 25-item posttest consisting of randomly selected words from the entire instructional unit, and (c) The Test of Written Spelling, a standardized measure, administered at the conclusion of instruction. The results of this spelling instruction study indicated that students taught with explicit rule-based strategies out-performed students presented with a visual imagery model on each of the dependent variables. The authors discuss the implication of these results for teachers of learning disabled students.

INTRODUCTION

There is a growing awareness that for instructional models to be effective with learning disabled students in rural settings, academic programs must be tailored specifically to meet the needs of those students. Parks, Ross, & Just (1982) assessed the current research in rural education and concluded that it is important to "develop distinctly rural models for providing students with adequate curricula and service" (p. 185). Because the development of rural special education programs present educators with a unique set of curriculum design problems, studies are needed that evaluate the effectiveness of various instructional approaches for learning disabled students in rural areas.

Teaching spelling to students in the elementary grades is an instructional area that has received considerable attention in the literature in recent years (Graham, 1983). Unfortunately, much of this work has been non-experimental in nature. Authors have often recommended spelling instruction approaches without research studies to support their claims of effectiveness. In response to this paucity of instructional research, both researchers and practitioners have emphasized the need for carefully controlled studies designed to evaluate the effectiveness of various approaches to spelling instruction (Englert, Hiebert, & Stewart, 1985).

The interest in spelling research is particularly lively in the area of learning disabilities. Although most students with learning disabilities have difficulty with all forms of written expression, spelling problems rank as some of the most difficult to remediate and are common among learning disabled students (Demaster, Crossland, & Hasselbring, 1986). In fact, several researchers (Deshler, Schumaker, Alley, Warner, & Clark, 1982) have indicated that problems with spelling effectively discriminate between learning disabled adolescents and other low performing students. Although, as Graham and Freeman (1985) state "spelling instruction has received little attention in the research literature" (p. 267), descriptive studies have been published in which the spelling abilities of learning disabled and non-learning disabled students have been addressed and compared.

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Several researchers have focused on the performance deficits of learning disabled students and have suggested that the spelling problems exhibited by these students can be attributed to structural or ability deficits (Graham & Freeman, 1985). Recently, however, studies have indicated that LD students' spelling difficulties are a function of strategy-production deficits (Gerber, 1986; Nulman & Gerber, 1984). Research that evaluates the types and causes of strategy deficits are important to the development of an effective technology of spelling instruction. For example, if the problems learning disabled students exhibit in spelling are a function of strategy deficits, then effective spelling instruction should include teaching students specific spelling strategies, and then provide practice in applying these strategies to a variety of words. Indeed, Bailet and Lyon (1985) asserted that "deficient rule application, either alone or in combination with other processing difficulties, can cause spelling difficulties" (p. 164). If this assertion is correct, then more studies that evaluate the effectiveness of various strategy approaches to spelling instruction are sorely needed. Unfortunately, few have been reported to date.

The purpose of the present study was to investigate the relative effectiveness of two different approaches for teaching spelling to rural fourth grade learning disabled students. One group of students was taught spelling with a visual imagery mnemonic, while the other group was presented with rule-based spelling strategies. Both of these approaches were designed to teach students a spelling strategy; however, the two strategies differed greatly. A visual imagery strategy is a generic method that can be applied to any word-type students are taught. If found to be a successful technique, visual imagery would be a relatively cost effective instructional method to implement in most classrooms. In addition, teachers would find it appealing because visual imagery is easy to implement. Several researchers have suggested that because of the cognitive deficits exhibited by LD students, techniques like visual imagery, which help the student focus his/her attention to a task, may be helpful (Rose, Cundick, & Higbee, 1983). To date, no spelling research investigating the effectiveness of visual imagery with elementary grade LD students has been reported. However, Sears and Johnson (1986) investigated the effects of using a visual imagery strategy for spelling instruction of non-handicapped fourth to sixth graders. Results of this study indicated that a visual imagery approach was superior to an auditory treatment in which students were taught to focus on the relationship of the sounds in each word. Sears and Johnson suggested that, because spelling is a visual activity, approaches to spelling instruction which are primarily auditory in nature will not be as effective as visually based approaches.

If this conjecture is true, it is suggested that teaching students with explicit rule-based strategies may be less effective than imagery based mnemonics. Recently, however, results of studies designed to evaluate the effects of strategy training with learning disabled students have been reported that suggest otherwise. In one study, Graham and Freeman (1986) examined strategy training in the context of several experimental conditions. The results of their study indicated that LD students who were taught a five-step study strategy spelled more accurately than did control subjects. These authors concluded that "LD students' spelling difficulties are associated with problems in self-regulation of organized, strategic behavior" (p. 15). It should be noted that the Graham and Freeman study did not compare the effectiveness of teaching LD students different spelling strategies.

Robinson and Hesse (1982) studied the differential effectiveness of the Spelling Through Morphographs Program with low, average, and high performing seventh graders. Spelling Through Morphographs (Dixon & Engelmann, 1979) involves a rule-based strategy approach that is similar to the structure of the spelling approach used in the Spelling Mastery treatment utilized in the present study. Results of their study indicated that low and average ability students who received instruction based on a rule-based strategy approach displayed significant spelling achievement gains when compared to controls. When the performance of the high achieving students was evaluated, less success was found. The results of this study have implications for designing spelling programs for learning disabled students and led to the design of the present study.

METHOD

Subjects and Setting

The subjects for this study were 28 learning disabled students who attended a university based summer program located in the rural southeast. Each of the students participating in this study had a history of low academic achievement. In the summer program, the students received remedial instruction in a variety of academic areas.

Of the 28 subjects, 7 were black and 21 were white. Twelve females and 16 males participated in the study. The mean age of the entire sample was 10 years, 6 months. The mean full scale IQ for the entire sample was 92. The subjects had been placed in programs in their local districts based on both federal and state guidelines for learning disabilities. These guidelines required that identified students demonstrate at least average potential as measured by a standardized intelligence test and exhibit a significant discrepancy in one of the major academic areas.

All subjects were administered the spelling subtest of the Wide Range of Achievement Test (Jastak & Jastak, 1984) as a pretest. This test was individually administered approximately 1 week before beginning the experimental interventions. Relative to grade placement, the spelling achievement of the total sample of students was low (spelling grade level mean = 3.7). Although there were slight differences in spelling achievement between the two groups, the result of a t-test for independent samples indicated that these differences were not significant ($p > .05$).

Four graduate students completing their training program served as examiners and experimental teachers. To control for potential teacher bias effects, teachers were randomly assigned to either the Spelling Mastery Group or the Visual Imagery Group. After the teachers had been randomly assigned to their instructional group, each teacher met individually with the senior author for training in how to implement their respective spelling program. The senior author met with each teacher twice for approximately 1 hour each time. During these training sessions, the correct instructional procedures for the appropriate spelling program were modeled. Through role playing, the teachers practiced the instructional procedures and were critiqued by the senior author. All teachers were judged to have mastered their respective instructional strategies.

Subject Assignment, Instructional Materials, and Procedures

In order to compare the relative effectiveness of two different approaches for teaching spelling, fourth grade LD students were randomly assigned to either a group which received instruction involving visual imagery or a group receiving rule-based spelling instruction. To increase the external validity of this study, each instructional intervention lasted for approximately 6 weeks, and instruction was provided to students in groups.

To ensure internal validity of this study, certain aspects of the instructional presentation were controlled across both groups. For example, students in both treatment groups received instruction for 25 days. Length of these daily instructional sessions was also comparable, about 25-30 minutes per treatment group. Additionally, the spelling words used in each of the treatment groups were identical, consisting of the practice words that were presented in the Spelling Mastery Program. Lessons for the Visual Imagery group were developed around these words. Lessons for both the Spelling Mastery Group and the Visual Imagery Group were scripted which allowed for the individual treatments to be implemented uniformly and appropriately.

In spite of the similarities, there were several critical curriculum design differences between the two instructional groups. In the Spelling Mastery Group, the students were taught spelling with the use of explicit rule-based strategies. The three major strategies taught to this group of students were: (a) morphemic analysis, (b) phonemic analysis, and (c) spelling rules. In addition, students in the Spelling Mastery group were provided with specified teacher-directed corrections during spelling instruction.

Spelling instruction in the Visual Imagery Group was vastly different and was based on the visual imagery model presented by Sears and Johnson (1986). In this approach students were not provided with the strategy training that students in the Spelling Mastery Group received. Instead, these students were taught a generic visual imagery framework that could be applied to words of any type. In addition, students in this group did not receive the systematic strategy based corrections utilized in the Spelling Mastery Group.

Spelling Mastery Program

Students in this treatment group received spelling instruction based on Level C of the Spelling Mastery Program (Dixon & Engelmann, 1979). This commercial program contains 137 lessons and is designed to improve the spelling skills of fourth grade students by teaching curriculum based spelling strategies. Students in this treatment group received instruction on selected lessons through lesson 40 in the program. The Spelling Mastery Program, like other similarly designed direct instructional programs (Gersten, Woodward, & Darch, 1986) has scripted lessons, so

that the teacher is provided specific directions concerning how to implement the lessons and what to say to the students. The most significant curriculum feature of this instructional treatment is the teaching of spelling via carefully crafted learning strategies. In all, three salient strategies were taught to students in this group. Students were first taught the meaning of a morphograph and then were instructed to identify the component morphographs in words. Once this skill was developed, students were presented with extensive practice spelling words composed of these morphographs. In Table 1 an example of one of the lesson formats designed to teach students a morpho graphic analysis strategy is presented. As can be observed, students are presented with words which are composed of at least two morphographs. The students are asked to first identify each of the morphographs in the work and then to spell the complete word. This basic strategy was applied to several words.

Figure 1
Sample Spelling Mastery Strategy for Teaching Morphographic Analysis

1. Find Part D on your worksheet. Get ready to write some words that have more than one morphograph.

2. First word: breakable What's the first morphograph in *breakable?*
   Signal. Break.
   Next morphograph? *Signal.* A-b-1-e.

3. Write *breakable.*

4. Next word: *restlessness.*
   What's the first morphograph in *restlessness?*
   Signal. Rest.
   Next morphograph? *Signal.* Less.
   Next morphograph? *Signal.* Less

5. Write *restlessness.*

6. For *misjudge, refillable, unkindness,* and *charming,* have students identify each morphograph and write each word.

7. Correct Part D.

Taken from Dixon & Engelman (1979, Level C, Spelling Master Program).

Another strategy used with this treatment group was teaching students to apply phonemic analysis to spelling. With this strategy a student was first provided a rule and then was asked to apply this rule to a carefully sequenced group of practice examples. Finally, students were taught several spelling rules that allowed for systematic application of a spelling strategy to many words. An example of a spelling rule taught to students is the rule for dropping the final e in a word (e.g., value/valuing).

Visual Imagery Group

Students in this treatment group received spelling instruction based on the visual imagery model discussed by Sears and Johnson (1986). Students were presented with the same practice words that the students received in the Spelling Master group, about 15 words per lesson. Because instruction occurred in groups, an overhead projector was used to present spelling words to the students. When a word was presented, the students were directed to look at the word and apply a four step visual imagery model. This was done by the teacher who implemented the following procedure: (1) after covering the word the teacher asked the students if they could see the image of the word in their mind; (2) the students were then directed to imagine the word displayed on a large outdoor screen; (3) next, the students were asked to imagine each letter of the word pasted onto the screen; and (4) finally, the students were told to help themselves to remember the word by visualizing themselves nailing the letters of the word onto the screen.

This procedure was used with the first several words presented to the students. Once the students had completed the teacher guided part of the lesson they were asked to apply the visual imagery strategy, without teacher assistance, to several words from a list that had been passed out by the teacher. Typically, the list contained five to seven words. This independent practice was closely monitored by the experimental teacher and typically required 5 to 8 minutes. Once the students had completed this independent activity, and if there was still time left in the session, the students were directed to practice the visual imagery model on the words that appeared on the overhead screen.

Dependent Measures

There were three types of dependent measures used for this study. First, spelling was assessed with three unit tests that were administered approximately every 8 to 10 lessons. The purpose of these short tests was to evaluate the student's ability to spell a selected set of words presented in the lessons. The second measure was a posttest, comprised of words from the entire instructional unit. The third measure, The Test of Written Spelling (Larsen & Hammill, 1986), was administered to evaluate whether there were differences in the two instructional approaches on a broader, more comprehensive measure of spelling achievement. These dependent measures are discussed in more detail below.

Unit tests

At the end of approximately every 9 lessons a 10-item test made up of randomly selected words from the unit, was administered to all subjects. These tests were administered to the students as a group. All students had as much time as necessary to complete the tests. Whenever necessary, the rate of presenting the words was slowed to allow students to have time to apply their particular strategy to a test word. In total, there were three unit spelling tests administered during this study.

Posttest

After completion of the entire instructional program, students in both groups received a comprehensive posttest consisting of the words the students learned in each spelling program. In order to ensure that students were tested on a representative range of word-types presented in the programs, 25 words were randomly selected for inclusion on this posttest. The test was administered on the day following the last day of instruction. The testing procedure for the posttest was the same as that used for the unit tests. Testing was done in groups, with students given as much time as necessary to apply their particular strategy to a test word. Students were not assisted by the teacher if they had difficulty with a word. If students asked for help, they were told to attempt to apply the techniques they had learned in the spelling group.

Test of Written Spelling

The Test of Written Spelling (TWS) (Larsen & Hammill, 1986) was administered to students in each of the instructional groups the day following the last day of intervention. The TWS was chosen for this study because the test is designed to assess students' spelling performance on both predictable words (e.g., rule-governed) and unpredictable words (e.g., rule-governed). Therefore, it was possible to determine if there existed an interaction between word-type (predictable vs. unpredictable) and type of strategy instruction. Students were tested as a group by their respective teachers.

RESULTS

Examination of Table 1 indicates clear differences between the performances of the two experimental groups. The students taught in the Spelling Mastery group performed similarly on each of the probe measures. The range of performance for this group was 70% to 78% words spelled correctly. The Visual Imagery group performed consistently as well, however, their performance was appreciably lower. The Visual Imagery group scored at 47% correct on probe 1, 50% correct on probe 2, and 46% on probe 3. Results of a 2 x 3 (group x test) repeated measures ANOVA indicated a significant main effect favoring the Spelling Mastery group, $F(1, 26) = 33$, $p < .01$. There was no significant test effect, nor was there a significant interaction.

The results of each group on the 25-item posttest along with the scores on the Test of Written Spelling for the subtests of predictable words (e.g., rule-governed words) and unpredictable words (e.g., irregular words) are presented in Table 2. The results of the postest are consistent with the results of the probe measures. As can be seen in Table 2, the average score on the posttest was 17 words correct (68%) for the Spelling Mastery group, while the Visual Imagery group averaged 11 words correct (44%). There was a similar pattern of results on each subtest on the Test of Written Spelling. When the groups' performance on the Predicted Words subtest is considered, the Spelling Mastery Group scored higher than the Visual Imagery Group (29 words correct for the Spelling Mastery Group versus 24 words correct for the Visual Imagery Group). Similar results, favoring the Spelling Mastery group, occurred on the Unpredictable

Words subtest (15 words correct vs. 11 words correct). Multiple Analysis of Variance (MANOVA) procedures were used to evaluate the effect of student performance on the three dependent variables: (a) the 25-item posttest, (b) the predictable words subtest form the TWS, and (c) the unpredictable word subtest form the TWS. The results of the MANOVA indicated that there were significant differences between the Spelling Mastery group and the Visual Imagery group, $(2, 24) = 9.87$, $p < .01$. Separate one-way analyses of variance were calculated for each of the three dependent variables to determine where these differences occurred. In each analysis ($p < .01$) there was a significant difference favoring the Spelling Mastery group on each dependent measure.

DISCUSSION

Results of the present study indicate that the students taught with an explicit rule-based strategy approach outperformed students who were presented with a visual imagery spelling strategy. This finding is important for two reasons. First, it will help teachers in rural settings make informed instructional decisions when developing new spelling programs for disabled students. Rule-based spelling strategies, when presented with explicit teacher modeling and detailed correction procedures, are superior to approaches that fail to teach students how to use a specific approach for different word-types. Because rural school districts serve a disproportionate number of special education students, effective and cost efficient instructional models are desperately needed so that teachers can improve the academic performance of learning disabled students. The results of the present study suggest a model of curriculum design teachers in rural programs can use to modify existing commercial instructional programs.

The outcomes on the three probe measures allow a comparison between the treatment groups on a short-term recall measure. The students who taught to use rule-based spelling strategies performed in the 75% correct range (see Table 1). Conversely, the students who were taught to use a visual imagery strategy scored much lower, in the 50% correct range. Although the students in the rule-based strategy group scored higher, it is important to note, however, that they did not perform at a mastery level. Several researchers have demonstrated that for learning disabled students to apply learning strategies effectively, in unprompted contexts, these students must be given extensive practice in applying these strategies. Although the Spelling Mastery Program provides practice in the application of spelling rules, the amount of practice that was provided in the present study was inadequate. The typical learning activity in the Spelling Mastery Program requires that the students work with that teacher on several words, practice applying the appropriate rule, then work independently on three to five words. Learning disabled students will likely require many more practice examples to achieve mastery.

Analysis of the posttest results allows for a comparison between the experimental groups on a measure that was designed to assess spelling retention across 25 days of instruction. Because previous researchers have confirmed the memory problems of learning disabled students (Gelzheiser, Solar, Shepard, & Wozniak, 1982), the performance of each group was expected to be lower on the posttest than on the Probe measures. Although each group did perform at a lower level on the posttest (see Table 2), these differences were slight. What is important to recognize, however, is that the students who were taught with rule-based strategies significantly outperformed the students in the Visual Imagery Group. This result supports the assertion that teaching LD students rule-based spelling strategies, in a direct instruction format, is a superior instructional method when long-term retention is evaluated. Students in the Spelling Mastery group were able to apply spelling strategies to new, untaught words. Even though rule-based strategies can be rather detailed, and may sometimes be difficult for learning disabled students to apply, this approach was still superior to the visual imagery method.

Research in memory performance of learning disabled children has shown that these students often exhibit retrieval, organizational, and/or selective attention deficits (Tarver, Hallahan, Kauffman, & Ball, 1976). Results of the present study indicate that providing learning disabled students with explicit rule-based strategies enhances the ability of these students to perform on memory tasks. It also seems clear that packaged programs, like the Spelling Mastery program, will probably benefit greatly from modification. Teachers will need to include more guided practice when a strategy is first introduced so that learning disabled students can efficiently apply strategies when working independently. One possible explanation as to why the visual imagery approach may have been less effective is that during the instructional sessions the teacher could not be sure whether the students

were actually using the imagery model when they were spelling practice words. In contrast, the students who were taught rule-based strategies were required to apply spelling rules in an overt, observable manner. This allowed the teacher to closely monitor the students and to ensure that they were actually applying the specified strategies. Also, the teacher was able to provide corrective feedback during the learning process, not just correction as to whether a word was spelled correctly. Other researchers have shown the effectiveness of process feedback during instruction (Gersten et al., 1986).

Carpenter and Miller (1982) reported that learning disabled students have difficulty spelling both regular and irregular words. It is therefore important to study whether certain spelling approaches are differentially effective with various types of words. Student performance on the subtests of the Test of Written Spelling allow for such an analysis. Because both regular and irregular words were assessed on this instrument, it is possible to determine if an interaction existed between instructional approach and word type. As can be noted in Table 2, the Spelling Mastery group outperformed the Visual Imagery group on both subtests; regardless of whether students were assessed on regular or irregular words, the students who learned rule-based strategies performed higher, although the scores for both groups dropped appreciably when irregular words were assessed (61% correct for the Spelling Mastery froup and 45% for the Visual Imagery group). When discussing how teachers can help teach LD students to memorize, Gelzheiser, et al. (1983) commemted: " . . . if the goal of the training is generalized improvement in the ability to memorize, simply teaching children a fixed mnemonic will not be adequate" (p. 423). As the results of the present study indicate, teachers who decide to use visual imagery because they think that students will be able to successfully apply this general technique likely will be disappointed in the outcome.

Table 1
Means and Standard Deviations for Number of Correct Spelling Words on the Probe Measures

	Treatment			
	Spelling Mastery		Visual Imagery	
Test	M	SD	M	SD
Probe 1a	7.9	1.5	4.7	2.0
Probe 2a	7.2	1.3	5.0	1.6
Probe 3a	7.8	1.2	4.6	2.0

[a]Probe test scores are based on 10 possible items

Table 2

Means and Standard Deviations for Number of Correct Spelling Words for the Posttest and Predictable, Unpredictiable for the Test of Written Spelling

	Treatment			
	Spelling Mastery		Visual Imagery	
Test	M	SD	M	SD
Posttest[a]	17.5	3.8	11.7	4.1
Predictable words[b]	29.2	4.2	24.0	4.2
Unpredictable words[c]	15.2	4.2	11.2	2.0

[a]Posttest scores are based on 25 possible items.
[b]Predictable word subtest scores are based on 35 possible items.
[c]Unpredictable word subtest scores are based on 25 possible items.

REFERENCES

Bailet, L. L., & Lyon, R. (1985). Deficient linguistic rule application in a learning disabled speller: A case study. *Journal of Learning Disabilities, 18,* 162-164.

Carpenter, D., & Miller, L. (1982). Spelling ability of reading disabled LD students and able readers. *Learning Disability Quarterly,* 65-70.

Clark, F. L., Deshler, D. D., Schumaker, J. B., Alley, G. R., & Warner, M. M. (1984). Visual imagery and self-questioning: Strategies to improve comprehension of written material. *Journal of Learning Disabilities, 17,* 145-148.

Demaster, V. K., Crossland, C. L., & Hasselbring, T. S. (1986). Consistency of learning disabled student's spelling performance. *Learning Disability Quarterly, 9,* 89-96.

Deshler, D. D., Schumaker, J. B., Alley, G. R., Warner, M. M., & Clark, F. (1982). Learning disabilities in adolescent and young adult populations: Research and implications. *Focus on Exceptional Children,* 1-12.

Dixon, R. & Engelmann, S. (1979). *Corrective spelling through morphographs.* Chicago: Science Research Associates.

Englert, C. S., Heibert, E. H., & Stewart, S. R. (1985). Spelling unfamiliar words by an analogy strategy. *The Journal of Special Education, 19,* 281-306.

Gelzheiser, L. M., Solar, R. A., Shepherd, M. J., & Wozniak, R. H. (1983). Teaching learning disabled children to memorize: A rationale for plans and practice. *Journal of Learning Disabilities, 16,* 421-425.

Gerber, M. M. (1986). Generalization of spelling strategies by LD students as a result of contingent imitation/modeling and mastery criteria. *Journal of Learning Disabilities, 19,* 530-537.

Gersten, R., Woodward, J., & Darch, C. (1986). Direct instruction: Designing successful curriculum for the handicapped. *Exceptional Children, 53,* 17-31.

Graham, S., & Freeman. (1985). Teaching basic academic skills to learning disabled students: A model of the teaching and learning process. *Journal of Learning Disabilities, 18,* 528-534.

Graham, S. (1983). Effective spelling instruction. *The Elementary School Journal, 83,* 560-567.

LaBerge, D., & Samuels, S. J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology, 6,* 293-323.

Larsen, S. C., & Hammill, D. D. (1986). *Test of written spelling (TWS - 2).* Austin, Texas: Pro Ed.

Leong, C. K. (1983). Promising areas of research into learning disabilities with emphasis on reading disabilities. In J. P. Das, R. G. Mulcahy, and A. E. Wall (Eds.), *Theory and research in learning disabilities* (pp. 3-26). New York: Plenum Press.

Parks, G., Ross, P., & Just, A. (1982). Education in rural sociology in the United States: Issues for the 80's, Westview Press: Boulder, Colorado.

Robinson, J. W., & Hess, K. D. (1981). A morphemically based spelling program's effect on spelling skills and spelling performance of seventh grade students. *Journal of Educational Research, 75,* 56-62.

Rose, M. C., Cundick, B. P., & Higbee, K. L. (1983). Verbal rehearsal and visual imagery: Mnemonic aids for learning disabled children. Journal of *Learning Disabilities, 16,* 352-354.

Sears, N. C., & Johnson, D. M. (1986). The effects of visual imagery on spelling performance and retention among elementary students. *Journal of Educational Research, 79,* 230-233.

Tarver, S., Hallahan, D., Kauffman, J., & Ball, D. (1976). Verbal rehearsal and selective attention in children with learning disabilities: A developmental lag. *Journal of Experimental Child Psychology, 22,* 375-385.