THE EFFECTS OF THE MODEL, LEAD, TEST ERROR CORRECTION WITH FLASHCARDS FOR TEACHING A STUDENT WITH LEARNING DISABILITIES FIRST GRADE SIGHT WORDS

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Abstract: *The purpose of this study was to study the effects of a model lead test (MLT) format along with a reward system for teaching sight words. The participant was a third grade student with learning disabilities enrolled in an elementary resource room. The number of correct sight words was the major dependent measure. These data were gathered before instruction and after instruction. A multiple baseline design across word sets was utilized. The outcomes indicated that the MLT with flashcards and a reward system were effective in improving the sight word recognition. Follow up data indicated that these gains were maintained. The efficacy of employing such procedures in the classroom setting was discussed.*

Keyword*s: model lead and test, error correction, direct instruction, sight words, learning disabilities*

INTRODUCTION

Over the last twenty years, the number of students who are classified as learning disabled has grown drastically (Martin, Martin, & Carvalho, 2008). Children with learning disabilities struggle with reading, writing, and math. The area of reading is the most common problem that students with learning disabilities experience at school (Heward, 2013; Swanson, 1999; Swanson, Harris, & Graham, 2013). It is critical for struggling students to learn to read because reading is essential in all academic areas and throughout one's life.

It is important for all children to become proficient readers regardless of their disability. This can be achieved by teaching students become fluent readers (Helman & Burns, 2008). One of the components of becoming a fluent reader is to recognize sight word vocabulary (Helman & Burns, 2008). Sight word vocabulary can be defined as those words that are referred to as "high-frequency words" (Fry & Kress, 2006; Helman & Burns, 2008). In order for children to become successful and fluent readers, they must establish a sight word vocabulary (Johnston, 2000;

Stuart, Masterson, & Dixon, 2000). By creating this word bank for children, they will find reading to be meaningful and not a struggle (Grenwood et al., 2008). This is why it is especially important to teach students with learning disabilities sight words as it will only increase their ability to become successful and fluent readers (National Reading Panel, 2000).

In order to teach students with learning disabilities many teaching methods have proven successful. The two most prominent methods that have been used in schools are the "whole language approach" and "Direct Instruction" (Martin et al., 2008). Direct Instruction is a teaching method that is teacher-directed and has evidence of effectiveness for many students (Drecktrah & Chiang, 1997). It involves the breaking down of material, interactive lessons, direct feedback, and clear guidelines and expectations (Carnine, Silbert, Kameenui, & Tarver, 2004; Houtveen & van de Grift, 2007). One teaching tool that falls within Direct Instruction is using the "Model lead test" approach (Carnine, Silbert, & Kameenui, 1997). The "model, lead, test" approach guides students through the learning process (Johnston, 2000). Through this approach, students are able to see what is expected of them and are given the opportunity to practice the skill (Carnine et al., 1997, 2004).

The model, lead, test approach has been implemented as part of a larger intervention such as classwide peer tutoring (Greenwood, Dinwiddie, Bailey, et al., 1987), strategy instruction in reading (Taylor, Harris, Pearson, & Garcia, 1995), and story mapping to improve comprehension (Mathes, Fuchs, & Fuchs, 1997). The model, lead, test has also shown to be effective improving a wide range of behaviors. For example, Peterson, McLaughlin, Weber, and Anderson (2008) employed a model, lead, test format to teach a single student with autism the concept of "where are you? They found that using model, lead, and test error correction was successful in teaching a single student with autism various locations throughout his school. Recently, Shouse, Weber, McLaughlin, and Riley (2012) were able to teach a preschool student with disabilities using the model, lead, and test error correction procedure. They found that after teaching this skill, the removal of the model, lead, and test procedure, student performance remained accurate. Bulkley, McLaughlin, Derby, and Carosella (2012) were also able to successfully employ model, lead, and test error correction procedures to teach various letter sounds to three elementary school students with learning disabilities.

There is a large body of literature where model, lead, and test have been implemented within the framework of DI flashcards. When employing flashcards, the model, lead, and test takes place when the student misses a flashcard by either giving the wrong answer, to taking longer than the time allotted by the instructor to answer. DI flashcards have been successfully employed to teach preschool students various pre-academic skills such as numbers and shapes (Albade, Altharwa, McLaughlin, Neyman, & Rinaldi, 2013; Mangundayo, McLaughlin, Neyman, Williams, & Toone, 2013), basic math facts (Erbey, McLaughlin, Derby, & Everson, 2011; Skarr, Ruwe, Zielinski, Sharp, Williams, & McLaughlin, 2014), and sight words (Crowley, McLaughlin, & Kahn, 2013). The type of students employed in this research have ranged from

preschool special education students with developmental delays to high school students with moderate disabilities (Hayter et al., 2007). Also model, lead, and test error correction with flashcards has been implemented and evaluated in the home (Aldahri, Weber, & McLaughlin, 2013) as well as in various classroom settings (i. e. Shouse et al., 2010).

In this study, the effects of the model, lead, test approach with flashcards was utilized to gain information on how well the student learned and retained sight words. Another purpose of the present study was to evaluate the effectiveness of the model, lead, test approach with flashcards in teaching a child first grade sight words both before instruction and after instruction. The final purpose was to replicate and extend our previous research employing model, lead, and test error correction procedures (Bechtoldt, McLaughlin, Derby, & Blecher, in press; Peterson et al., 2008; Shouse et al., 2012;) with an older student with a learning disability.

Methodology

Participant and Setting

The student was a third grade student with learning disabilities, who attended a public elementary school and was enrolled in a special education resource room in the Pacific Northwest. According to curriculum based assessments and the *Woodcock Johnson III* (Woodcock, McGrew, & Mathers, 2001) given at the beginning of the school year, the student was achieving at a kindergarten to first grade level academically across reading, writing, and math. Based on the *Woodcock Johnson III*, the participant showed a grade equivalent of kindergarten, 9th month (K.9) in broad reading. His letter-word identification was at the first grade level (1.4) and his reading fluency was below the kindergarten level (<K.7). From the many curriculum-based assessments the first author gave to the student, the first author noticed the child could recognize all letters, but did not know all the letter sounds. The student was also only able to read a passage of 66 words at the pre-primer level with 70% accuracy. This information gathered showed that the student needed extra-assistance in reading, especially when it came to identifying sight words.

The study took place in the special education resource room. The classroom had 3 to 10 students in the room in a given session and was relatively quiet depending on the type of class assignments taking place. Each session took place at one of three tables that were designed for individual or small group instruction in the classroom.

Materials

For the study, the materials that were used were flashcards and rewards. The flashcards were used to teach and test the student on sight words during every teaching session and for the pre-

and posttests. Each flashcard had one sight word hand-written on it. The rewards consisted of contingent praise, as well as candy, apples, sticker charts, stickers, and temporary tattoos.

Dependent Variable and Measurement Procedures

The dependent variable was the number of correct oral responses after being presented with a sight word flashcard. In order for the word to be counted as correct, the student had to say the word accurately within 5 seconds of the presentation of the flashcard and without additional endings, etc.

The first author collected data in three different ways. First was a pre/posttest format of 191 words, second was a test of all 30 words in Sets 1, 2, and 3, which occurred before the teaching session, and third was a test of all 30 words in Sets 1, 2, and 3, which occurred after the teaching session.

After giving a pretest, the first author recorded the amount of words correct out of 191. This was done by the first author putting the flashcards into two separate piles, corrects and incorrects. The first author then highlighted all of the words identified as correct on a sheet of paper containing all 191 words.   From the words identified as incorrect the first author developed three sets of ten words. These sets included words from the preprimer, primer, and first according to the Dolch word list (Dolch, 1948). Three of the words in each set were already considered mastered prior to intervention based on the data from the pretest; this was done to ensure success for the student. At the end of the study, a posttest was given to the student to determine the student's retention of words that were taught.

The first author would record the student's results from testing sessions on data-collection sheets. Correct and incorrect responses were shown by a plus (corrects) or a minus (incorrects) in the appropriate box. If the word was "like" and the student said, "play," "that," and then "like," the word was marked as incorrect. If the student was presented with the word "have" and said "took…have" by self-correcting immediately the word was considered correct. One minute timings were also completed during this process to see the amount of words the student answered correctly and incorrectly in a minute. A zero was placed on the data-collection sheets under the one-minute box if the student was not given an opportunity to respond to a given word. This procedure was done at the beginning of the session and also at the end of the session.

Experimental Design and Procedures

The study used a multiple baseline design (Barlow, Nock, & Hersen, 2008; Kazdin, 2011; McLaughlin, 1983) across sets of words. Instruction began on the next set of words occurred after the student showed in increase of mastery from current or previously taught sets of words.

Pretest/ posttest. The student was given a pretest of 191 first grade sight words. The student was asked to say the word after the first author displayed a flashcard and said "what word?" The sets of words were made up of preprimer, primer, and first grade words according to the Dolch word list (Dolch, 1948). After all 30 words were taught a posttest was given in the same manner as the pretest. No praise or feedback was given to the student during the pre/posttest. The student was given praise and rewards when he completed what was asked of him. With post-testing and follow-up, we attempted to assess maintenance of treatment effects were assessed (Stokes & Baer, 1977, 2003) of our intervention

Baseline. Baseline data was established by testing the student on all thirty words from Sets 1, 2, and 3. The procedure for baseline followed the same format as the pre/posttest condition. The student was given a test on all thirty words before and after each teaching session. During these testing sessions the student was timed to see how many words he answered correctly and incorrectly in a minute. The testing sessions were administered so a card would appear and the first author would say, "what word?" and the student would respond. After a minute had passed the first author continued the process, but began putting the flashcards into separate piles to differentiate between what words were answered correctly and incorrectly in a minute and which words were answered correctly and incorrectly after the minute.

Flashcards. The student was taught the sight words by using a model, lead, test approach with flashcards. Each lesson took approximately 15 to 30 minutes to complete. During the lesson, the student was given praise, "high fives," candy, slices of an apple for participation, as well as corrective feedback, such as "this word is play." When the student was being taught the words the first author presented the word by saying, "this word is, "play" followed by "what word?" and the student then responded with the word "play." If the student, did not say the word correctly the first author then repeated the model until the student answered with the correct word. After completing this with all words in the set, the first author implemented the direct instruction flashcard system. When the word was said correctly, the card was placed in the back of the deck. When it was answered incorrectly, the card was placed three to four cards behind where it first appeared so it would come up quickly for review. This placement in the deck was repeated until the word was said correctly three times in a row, then the card was placed in the back of the deck (Hayter, McLaughlin, Weber, & McLaughlin, 2007). Set 1 was taught first, Set 2 was added to the words being taught. Next both Set 1 and 2 words were provided with instruction due to the student's previous inability to retain skills. Once set 3 began instruction all thirty words were provided with instruction.

Model, lead, test with flashcards and reward system (flashcards w/reward system). Beginning at session 11 the procedure was the same as before except that, the student was able to earn stickers for answering a certain number of words correct for that day. The student had the ability to earn two stickers each day, one before the teaching session and one after the teaching

session. The target number of words answered correctly began at 14 words and increased by one word daily. After the student answered 26 words correctly, the student was able to earn a sticker for 26 words correct or more for each day after that. When the student earned ten stickers, the student earned a king size candy of his choice. The student was able to earn nine stickers on his sticker chart at the end of the research project because the student only had an opportunity to earn nine stickers. Contingent rewards were given to the student throughout the study. The student was given praise when he answered words correctly and was awarded with given candy, apples, and other treats when finishing a task he was asked to complete.

Baseline with rewards. When rewards were added, only Set 1 was in treatment. This procedure allowed us to determine the effects of our reward system during model, lead, test and during baseline for Sets 2 and 3. This condition was in effect for three sessions for Set 2 and five sessions for Set 3.

Follow up. Data were taken for three times after formal data collection was terminated. This was done to assess the maintenance of treatment effects for the participant.

Interobserver Agreement

The cooperating teacher, instructional assistant, or substitute teacher collected interobserver agreement data. Agreement scores were computed by using an item-by-item agreement. Interobserver agreement was collected for 37.5% of the sessions that occurred before the teaching session and the mean agreement was 100%. Interobserver agreement was also collected for 45.8% of the sessions that took place after the teaching session and the mean agreement was 100%. Interobserver agreement was also collected for 33.3% of the follow-up sessions and the mean agreement was 100%.

Findings

The results of this study are shown in Figures 1, and 2. Figure 1 shows the student's correct responses out of 10 words in Sets 1, 2, and 3 before the teaching session. Figure 2 shows the student's correct responses out of 10 words in Sets 1, 2, and 3 after the teaching session.

Baseline

Baseline data were collected by testing the student with sight words for Sets 1, 2, and 3. The student's mean score of correctly saying sight words in baseline was 4.5 in Set 1 (range 4 to 5). For set 2, the mean score was 3.22 with a range of 1 to 5 before and after the teaching session. For Set 3, the mean score was 4.12 with a range of 2 to 6 before the teaching session. After the teaching session, the mean score for Set 3 was 3.35 with a range of 2 to 6. A standard celeration chart was used to show the sight words the student answered correctly and incorrectly in a minute. During baseline, the student's mean score for corrects was 8.75 (range 4 to 11) and incorrects was 10 (8 to 12). Baseline data was included on Figures 1 and 2.

Daily Tests

Before the teaching session data. The results in Figure 1 show the student's results before the teaching session. The student had an average score of 8.71 (range 8 to 9) for Set 1 when the intervention was solely the Model, lead, test with Flashcards. The second phase of the study included the intervention with a reward system and the student's average score increased 9.15 with a range of 7 to 10. In Set 2, the student's average score before the reward system was initiated was 2.5 (range 2 to 3). With the reward system in place, the average score for Set 2 was 7.23 with a range of 3 to 10. For Set 3, the student's average score was 8 with a range of 7 to 9. The first author also plotted data on a standard celeration chart, which showed the amount of incorrect and correct sight words in a minute timing. When the intervention was the Model, lead, test with flashcards the student had a mean score of 11.43 correct sight words (range 8 to 15) and a mean score of 11.86 incorrect sight words (range 9 to 15). When the reward system was added to the Model, lead, test teaching procedure with flashcards, the student's mean score for corrects was 15.85 (range 12 to 22) and errors was 5.23 (range 1 to 11).

After teaching session data. The results in Figure 2 show the student's results after the teaching session. The student had an average score of 8.88 (range 8 to 10) for Set 1 before the reward system was added. With the addition of the reward system, the student's average score for Set 1 was 9.38 (range 8 to 10) and in Set 2, the student's average score without the reward system was 2.67 (range 2 to 3). With the reward system in place, the average score for Set 2 was 7.15 with a range of 4 to 9 and for Set 3, the student's average score was 7.88 with a range of 6 to 9. On the standard celeration chart, the student had a mean of 12.25 corrects (range 7 to 17) and 12.25 errors (range 6 to 17). When the reward system was initiated along with the intervention, the student had a mean score of 13.08 corrects (range 9 to 16) and 4.31 errors (range 0 to 12).

Follow-up. To assess maintenance of treatment effects (Stokes & Baer, 1977, 2003), follow-up data were taken. Our student participated for three days of follow-up data throughout a school week. The student's average score for Set 1 was 9.33 with a range of 9 to 10 and for Set 2, the average score was 8.67 with a range of 8 to 9. For Set 3, the average score was 9.33 with a range of 9 to 10. On the standard celeration chart, the student averaged 12.67 corrects (range 11 to 14) and 1.33 errors (range 0 to 3).

Pretest and Posttest

The pretest was given at the start of study to assess the amount of words out of 191 the student could read out loud correctly. The student read 44 of the 191 words correct, giving the student a 23.04% on the pretest. After all 30 words were taught and the student showed mastery with

these words.   The posttest was given to assess the amount of words the student now knew out of 191. The student read 57 of the 191 words correctly, giving the student a 29.84% on the posttest.

Conclusion

The model, lead, test intervention with flashcards proved to be effective for teaching a student with learning disabilities his first grade sight words. The intervention was effective throughout the entire study, but when more than 10 words were taught, the student showed a lack of motivation. In order to make sure the intervention remained effective throughout the entire study, a reward system (Alberto & Troutman, 2013) was added to the model, lead, test intervention with flashcards. The reward system appeared to make the student to strive for accuracy, rather than simply guessing at the words, so he could get through all his 30 words in one minute. When the reward system was initiated with the model, lead, test intervention, the student showed improvement in his retention of sight words. During baseline, for Sets 2 and 3, the reward program did not affect the participant's outcomes as his performance remained low and stable. It was only when the model, lead, test procedure was added, did his performance improve.

When we plotted these data on a standard celeration chart (Lindsley, 1991), it did not indicate that the student was making large gains. Instead of becoming fluent with the words, the student and the first author focused on knowing the word. Because of this, the student did not try to speed through the entire deck of flashcards; rather, he focused on reading all words accurately and correctly. This is why a large increase in the amount of words read correctly was not seen. However, the standard celeration chart did show that the student made a drastic drop in the amount of errors overtime.

Suggestions and Recommendations

According to the master teacher, the student may not retain a great deal of information. However, by modeling the words before having the student complete the flashcard system, the participant had the opportunity to review the words before being asked to recall them from memory. This system proved to be successful throughout the entire study, except for a couple of words. The words "of" and "with" proved difficult for the student. It is still unclear as to why these words were difficult for the student. The student would occasionally say these words correctly, but the majority of the time the student guessed for these words.

The model, lead, test intervention with flashcards and a reward system was a practical method to implement and evaluate. The present case report extends and replicates our use of model, lead, test (Bulkley, McLaughlin, Derby, & Carosella, 2012; Hayter et al., 2007; Jones, Weber, & McLaughlin, 2013; Peterson et al., 2008; Sante, McLaughlin, & Weber, 2001; Shouse et al.,

2012; Skarr, McLaughlin, Derby, Meade, & Williams, 2012; Skarr et al., 2014) to another population and with a different skill (reading). The use of flashcards also allowed the participant to increase the number of opportunities to practice his sight words and be taught using explicit instruction (Helman & Burns, 2008). This method should be of interest for the classroom teacher, because it provides the students with a form of direct instruction. In order to implement this intervention, one does not need a great deal of extra time or money. It took a minimal amount of time, each lesson took 15 to 30 minutes, and flashcards were made before the study began. The only cost for the study was purchasing index cards and candy that was used for rewards throughout the study.

The strengths of this study involved the effectiveness of the intervention, the maintenance of sight words over time, ease of implementation, and the collection of data throughout the entire study. The intervention proved to be quite effective for this student because it gave the student the opportunity to learn to read words he could not read before. The first author could immediately determine that the intervention was effective from the data with the first set of words. The student was also able to generalize. He was given a passage before the study with some of the sight words present in the passage and he read the passage with 70% accuracy. By the end of the study, he could read the passage with 87.8% accuracy. The study was extremely easy to implement, requiring a limited amount of time. With each lesson the first author was able to observe positive outcomes. Finally, we were able to document maintenance of treatment effects (Stokes & Baer, 1977, 2003) for each set of words trained. The participant was able to have high rates of accuracy after formal data collection and instruction had ceased. This provides some evidence as to the ability of employing model, lead, and test to produce enduring effects. This has been a goal suggested by both the literature with Direct Instruction (Carnine et al., 2004) and some of our recent work-using model, lead, and test error correction procedures and flashcards (Bulkley et al., 2012; Hayter et al., 2007; Peterson et al., 2008; Skarr et al., 2012, 2014). The present intervention proved to be effective for this particular student and there is no reason it would not be effective for him when teaching other subject-matter areas, such as math or geography.

There were limitations in the present case report. First, the duration of data collection and analysis was short and ended with the first author's completion of student teaching. Second, the amount of words taught could have been larger. Out of the total of 191 sight words, the 30 words that were mastered only represented 16% of his total words. In order for the student to really show a great deal of growth, we would have liked to teach at least 50% of the words. Finally, we were only able to employ a single student. Out of the total of 191 sight words, this is only represented 16% of his total words. In order for the student to really show a great deal of growth, we would have liked to teach at least 50% of the words. Another weakness was the fact that our participant was often absent. Throughout data collection, he was continually absent the first day of the school week. This greatly reduced the time that we could work with the student.

The next weakness was the fact that we were able to show small gains from the pre to the posttest. The final limitation was the lack of any change in performance when the reward system was implemented with Set 1 sight words. However, the level of our participant's performance was high and increasing performance was difficult due to a ceiling effect in our data (Lindsley, 1990). Measuring fluency would have eliminated this issue.

The contribution of the reward system was interesting. This was shown when data were taken the day after or they day just before data collection. Using the reward system during baseline as well as during the model, lead, and test with flashcards quickly improved student performance. This was especially true with Sets 2 and 3 just before and after the intervention for that day. The use of a single case research design (Kazdin, 2011; Barlow et al., 2008) made those conclusions possible. This is just another example of the type of analysis that occur using single case research designs.

Further research in this area should focus on the retaining of sight word vocabulary in order to evaluate the effectiveness of our procedures further. Also, a future study should consider implementing the intervention with several students in order to ensure that the present were accurate and that the model, lead, test teaching approach with flashcards would be effective for most students.

Acknowledgements

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Figure Captions

Figure 1. The number of correct responses out of 10 words from Sets 1, 2, and 3 before the teaching session was conducted.

Figure 2. The number of correct words out of 10 words for Sets 1, 2, and 3 after the same-day teaching session had just ended.